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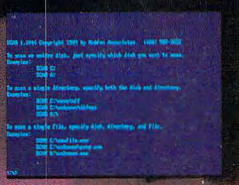

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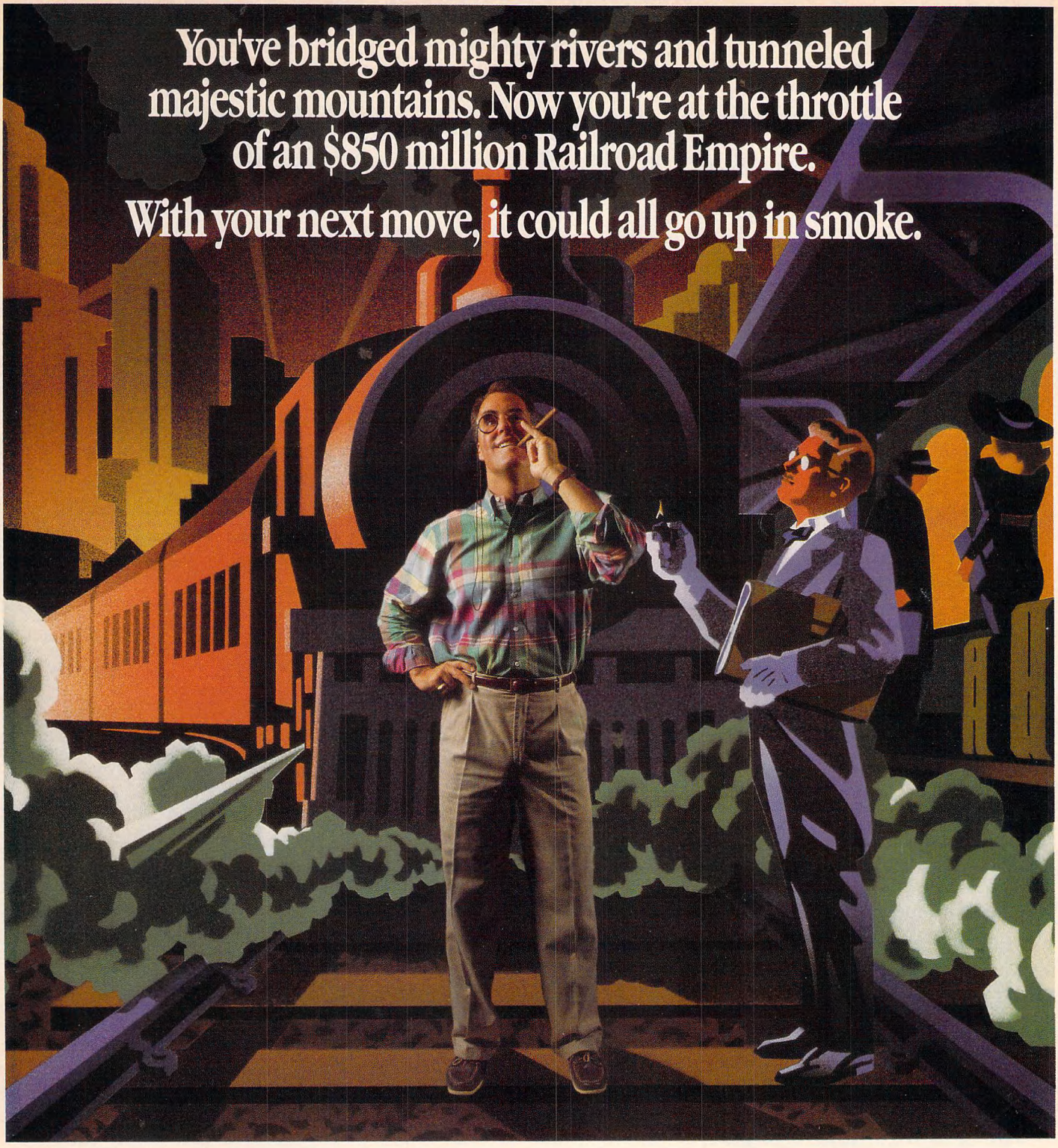

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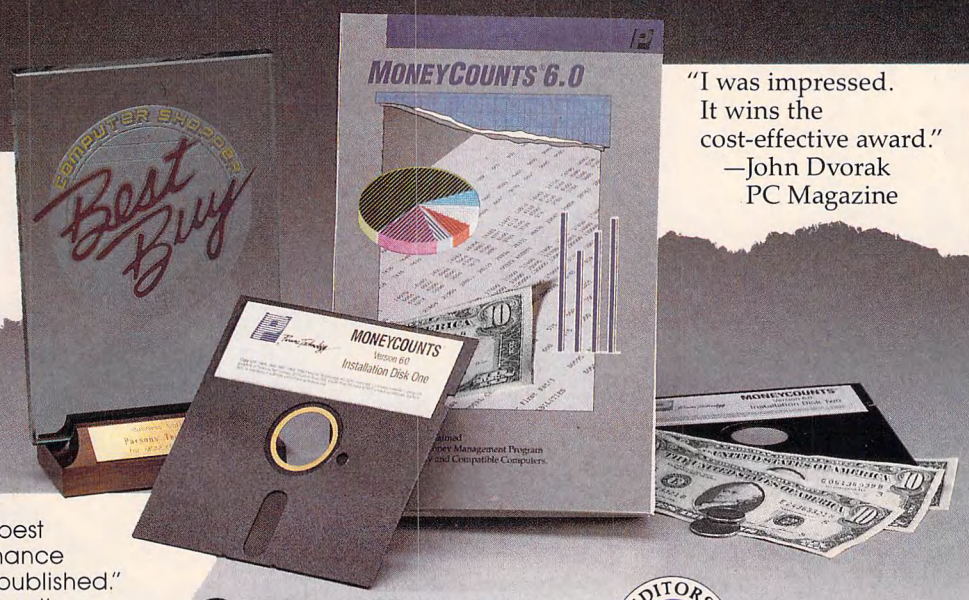

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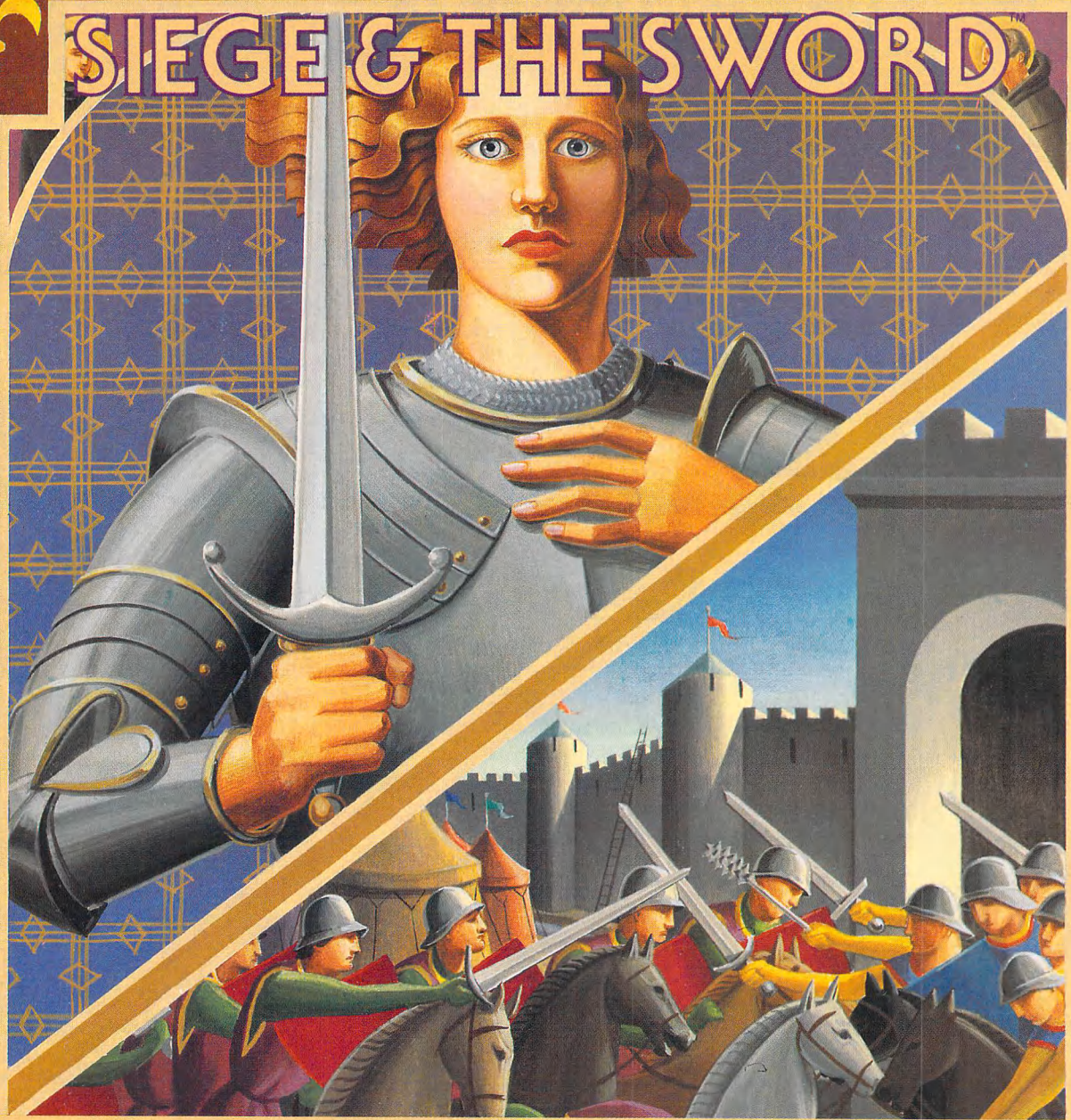

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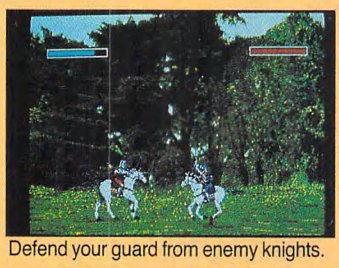

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EDITOR'S VIEW

What's a power user? Most people associate power users with lightning-fast 386s and superapplications like *Lotus 1-2-3*, *dBase*, and *Microsoft Word*. But that's looking at things from the wrong end. It's not hot hardware and slick software that make you a power user; it's *you*. To be more specific, it's your *attitude*.

If you're a power user, you want to have it your way. That's the power-user acid test. You make the computer adjust to what you want, and you do all you can to squeeze every bit of performance from your system.

You can be a power user with a 4.77-MHz PC just as easily as you can with a 33-MHz 386 jammed with 8MB of RAM. And you can be a power user with MS-DOS; you don't necessarily need *Windows* or OS/2.

Are you a power user? You may be one and not know it.

Are you a power user? You may be one and not know it. If you answer *Yes* to one or more of the following questions, you're either a full-fledged power user or you're on your way.

If you have a color system, have you changed the system's drab white text on a black background to something that's easier to read? You can change DOS colors with a program like *ColorSet* (March 1989), or you can dig into your DOS manual to find out how to control color with ANSI.SYS.

Have you installed a disk cache to make your system faster? Why wait on your hard disk or floppies when a cache can double-time your data? How about the PC's s-l-o-w cursor? If you've installed a program that gets that tortoise up and running, you're on the right track. (If you have DOS 4.0 or higher, you can use the new wrinkles in the MODE command to accelerate the cursor.)

Do you use macros? These can be a power user's best friend. They let you streamline tasks and really have it your way. You can use a stand-alone macro program or an application's onboard macros, or for a quick, no-cost way to experiment, you can tweak ANSI.SYS to map command strings to your function keys.

What about your manuals? Are they old friends, or are they more like malevolent strangers? If you always seem to be searching for just the right command or the right switch, you're a power user.

And how often do you automate your work with batch files? Most power users think batch files are conveniences right up there with sliced bread and indoor plumbing.

Do you know shortcuts and special commands that make working with your favorite applications faster or easier? If you do, you're on top of the power curve. And remember, you don't have to be running a so-called power application: *TurboCALC* (January 1990) can be just as much a power tool as the higher-priced spreadsheet.

Now that you've taken the test and you have the right power attitude, you're ready to tackle this issue's "Power Breakthrough—How to Upgrade to a 386." In this feature, George Campbell outlines strategies for moving up to this exciting, state-of-the-art technology. But pay particular attention to the section that discusses whether or not you need to upgrade. Remember, when it comes to being a *power user*, whether you're jockeying a vintage PC or a 386 screamer, *you're* the power.

Clifton Karnes
Editor

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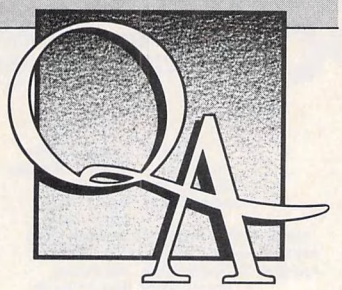

Macro Mania, Mysterious Lightpen, and More

Editors & Readers

Recently, I purchased a *COMPUTE!'s PC Magazine* disk and tried to make a backup copy. I formatted a blank floppy disk, then tried to copy all the files to the disk. Right in the middle of the copy, I got a *Disk Full* error message. Why wasn't there enough room for all the files?

You probably formatted the disk with the /S option. Disks formatted with this option become boot disks when COMMAND.COM and the two hidden files, IBMBIO.COM and IBMSYS.COM, are copied to the disk.

All together, these files take up about 70K of disk space. If you just want to make a backup disk, don't use the /S option when formatting. Or even better, use DOS's DISKCOPY command instead.

Batching the Keyboard

What is a macro, and what is it used for?

Gloria Shepard

This term commonly refers to a series of commands in a spreadsheet or word processing program. (They're sometimes called keyboard macros.*) Macros are much like batch files—they let you avoid having to repeat the same commands over and over again. Unlike batch files, macros are usually kept in the application itself rather than in a separate file.*

Macros allow a user to execute an entire sequence of keyboard commands with only one keypress. The commands in a macro are the same as the commands that you enter at the keyboard, but they're included in a special column in symbolic form.

For example, Lotus 1-2-3 *commands consist of one keypress—F for File and R for range, for instance. A* Lotus 1-2-3 *macro consists of a series of such one-letter commands that are entered into a spreadsheet column reserved for this purpose. (There are also ways to include special control keys such as Home or Return.) You name the column containing the commands with a single letter and then execute the series of commands by pressing the Alt key simultaneously with the letter key.*

If you often find yourself repeating the same commands, then it's time to create a macro to execute them for you. When designing macros, it's a good idea to begin by listing the sequence of commands on a piece of paper. Then test the sequence manually by entering it at the keyboard. When the sequence is correct, enter it into your spreadsheet or word processor.

Not only do macros increase your program's speed, they also increase its accuracy. You're less likely to make an error when entering a long series of commands when the program remembers the commands for you.

A macro can contain just a few commands, or it can perform many different tasks and reach a surprising degree of complexity. In fact, writing macros is a lot like programming in a simple computer language. Books containing complex and interesting macros are now widely available. You can incorporate these macros into your own applications.

Quick and Easy

The other day I was reading COMPUTE! Books' *Quick & Easy Guide to Using MS-DOS*. I came across the following text:

```
C> CHDIR \
C> COPY CON BUDGET.TXT
Budget
Info ^Z
        1 File(s) copied
C> MKDIR REPORT
C> CHDIR REPORT
C> COPY CON JAN.RPT
January Report
This report contains information on the
   month of January. ^Z
        1 File(s) copied
```

I have two questions about this example. When the first file is created, it's preceded with a CHDIR \ command, but the second is preceded by MKDIR and CHDIR. Why?

The second question is more basic: Why would anyone want to use the CHDIR or MKDIR command when CD and MD accomplish the same thing?

Pete Ritchie

The answer to your second question is that the longer form of the commands was used for clarity only. Since this is a book for beginners, the author felt that CHDIR was more descriptive and informative than CD. In practice, we use CD just like everyone else.

As for your first question, the author wanted the BUDGET.TXT file to go in the root directory. The command CHDIR \ *is the shortest way to get to the root directory of the currently logged drive.*

Working Overtime

I've been using a PC for almost a year now and would like you to clear up an issue of great concern to me. I don't use my PC full-time, only in the evenings and then only for a few hours at a time. I don't leave my computer on because most of the time I'm not using it.

My question is this: Should I leave the computer on all the time, or is it best for me to switch it on and off?

Jeffrey A. Algeirer

When a computer is turned on, there's an initial surge of power to all the components. This initial surge is hard on every system in your PC, especially the hard disk. Another danger with hard disks is that the power-up surge can corrupt the data beneath the disk's heads if they aren't parked.

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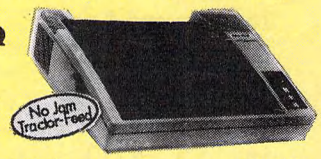

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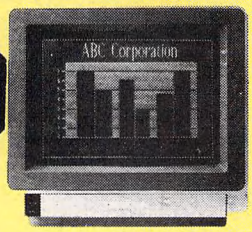

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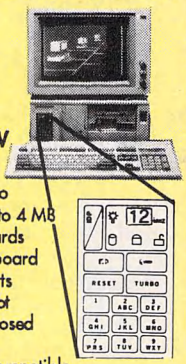

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You're probably following the best procedure—turn the computer on once, leave it on until you're sure you're finished with it, then shut it off. This avoids putting unnecessary stress on your computer while minimizing potential problems due to power failure.

Savings and Loan

In a BASIC program, how do you save to disk the data that's entered by the user? The next time the program runs, it should automatically load the data from the disk.

Brian Fourman

Data entered from a program can be saved to disk (and later reloaded, if necessary) using either a sequential- or relative-file format. Your BASIC manual should provide details on setting up and using both types of files. The game program below demonstrates a sequential-file technique.

```
10 CLS:ON ERROR GOTO 120
20 OPEN "DATAFILE" FOR INPUT
   AS #1
30 INPUT #1,PLAYER$,HISCORE
40 PRINT "Greetings, "PLAYER$". Your
   high score was"HISCORE"points."
50 CLOSE 1
60 REM MAIN PROGRAM — PLAYER
   NAME AND HIGH SCORE ARE
   ENTERED HERE
70 PRINT:INPUT "What is your
   name";PLAYER$:HISCORE=1000
80 OPEN "DATAFILE" FOR OUTPUT AS
   #1:REM END OF MAIN PROGRAM
90 WRITE #1,PLAYER$,HISCORE
100 CLOSE 1
110 END
120 IF ERR=53 THEN 60:ELSE PRINT
   "Error #"ERR"in line"ERL:STOP:REM
   ERROR HANDLER
```

In this program, line 20 attempts to read in a player's name (as PLAYER$) and a high score (as HISCORE) previously stored in the sequential file DATAFILE.

If no such file exists on the disk (which is true the first time the program is run), then error 53 occurs. When this happens, the ON ERROR statement in line 10 sends the program via line 120 to line 60.

Line 60 represents the beginning of the main portion of the program. The player's name and high score are entered in line 70. When the game is over (but before exiting the program), the data is written to the disk in lines 80–100.

The next time the program is run, DATAFILE is present on the disk and read in line 30. When the current game is completed, the file is overwritten with the updated data.

Light Writing

After using a light pen for a number of years, I was shocked to realize I don't know how it works! Surely the monitor doesn't read the light from the pen and pass its location back to the computer, does it?

Illan Glasner

This is a popular misconception about light pens. The light pen doesn't emit light, it detects it. Most computers use a technique called raster graphics *to produce their displays. The picture you see on the screen is actually made up of a number of horizontal lines. Each line is composed of tiny dots, or pixels. These dots are created by an electronic video beam, or raster.*

The electron beam starts at the top left corner of the screen and moves from left to right, lighting pixels as it moves. When the beam reaches the right edge of a line, it shuts off, moves back to the left, and drops down a line. This continues until the beam reaches the bottom of the screen. It then shuts off, moves to the top of the screen, and the whole cycle repeats.

The key to the light pen is that each pixel glows as the electron beam passes it. The light pen detects this light and signals the computer. The computer knows the location of the electron beam, so when it receives the signal from the light pen, it checks the location of the electron beam. It thus indirectly knows the location of the pen.

Error Proofing

I mostly program in BASIC. Can you tell me how to trap errors in my BASIC programs?

BASIC tries to handle its own errors. When it can't handle an error, BASIC goes to COMMAND.COM for help. Some errors are critical or unrecoverable errors. The only way to trap these critical errors is to call a machine language routine from your BASIC program. Information on calling machine language subroutines from BASIC can be found in your BASIC manual under the CALL statement. To learn how to write your own machine language routines, take a look at COMPUTE!'s book on machine language, COMPUTE!'s Beginner's Guide to Machine Language on the IBM PC *(COMPUTE! Books, Chilton Book Company, 1 Chilton Way, Radnor, Pennsylvania 19089).*

You can handle recoverable errors with the ON ERROR statement. When BASIC encounters an error, it goes to COMMAND.COM to retrieve an error-code number. This error code is placed in the variable ERR, and the line number where the error occurred is placed in ERRL (this is helpful in debugging programs).

Since BASIC scans your program for the presence of the error-trapping statement, it should be placed at the beginning of your program to make your program run faster. Be sure not to place any OPEN statements before the ON ERROR statement. The format for the ON ERROR statement is as follows:

```
10 ON ERROR GOTO line#
```

You should GOTO an error-trapping routine from the ON ERROR statement. Error trapping doesn't occur within an error-trapping routine; therefore, if an error occurs here, execution of the program stops, and an error message is printed.

Put the RESUME statement at the end of the error-trapping routine. This statement can be used in three different ways. RESUME continues execution with the line that caused the error. RESUME NEXT continues with the line after the line that caused the error. RESUME line# continues at a specific line number.

To disable error trapping, use ON ERROR GOTO 0. All errors following this statement will cause the program to terminate and print the appropriate error message.

As I mentioned earlier, ERRL and ERR hold the error-code number after an error has occurred. The ERROR statement can be used to send the error-code number to ERR to test the program for bugs. Place the ERROR statement before the ON ERROR statement.

```
10 ERROR error code#
20 ON ERROR GOTO line#
```

This sets ERR equal to the error-code number so you can test for that error. The BASIC error codes and messages are listed in your BASIC manual. Some of the more common error codes include file not found (53), file already exists (58), disk full (61), bad file-name (64), and too many files (67).

One error we've found that the ON ERROR statement would not trap was division by 0. To trap for this error, check the variable used as the divisor before any division takes place. If the variable is equal to 0, don't perform the division. Code with an appropriate error message or give the user a chance to input another value.

Do you have a question about hardware or software? Or have you discovered something that could help other PC users? If so, we want to hear from you. Write to PC Feedback, COMPUTE's PC Magazine, *P.O. Box 5406, Greensboro, North Carolina 27403. We regret that we cannot provide personal replies to technical questions.*

Editor's note: Unsigned letters in this column are compilations of reader inquiries. PC

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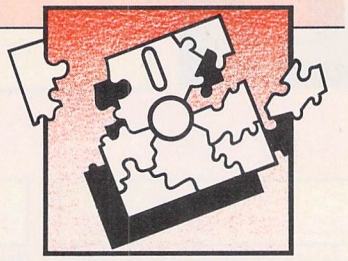

Ports: The Computer's Connections

Tony Roberts

Your computer communicates with the outside world via various *ports*. These ports allow your system to send information to printers, to send and receive data from a modem, or to receive information from a mouse or a joystick.

Joystick ports (often called *game ports*), are dedicated to game playing. Some systems include a built-in game port, but for most standard PC compatibles, this is an extra purchase.

Binary Universe

Parallel ports are used to send output to a parallel printer, and serial ports can be used with serial printers, modems, and some mice, as well as other specialized applications.

One of the differences between *parallel* and *serial* involves the method by which data is sent.

Computers store information in units called *bytes*, which are made up of subunits called *bits*. When information is transmitted through a serial or parallel port, it's broken into bits, sent out over the wires, and then reassembled on the other end.

The letter *A*, for example, is stored by the computer as the number 65. The computer refers to this number by its binary, or base 2, equivalent, 01000001. Each of the 1s and 0s in this representation is a bit.

Parallel vs. Serial

In parallel data transmission, eight wires are used to output data, while in a serial transmission only one wire is used for data.

To send the letter *A* (010000001) to a parallel printer, each of the eight bits is sent out over a separate wire all at the same time; the bits travel *parallel* paths.

In a serial application, all bits are sent over the same wire, serially, or one right after another.

Parallel ports also must be considered one-way conduits. Information goes out, but aside from such minor signals as *printer not ready* or *paper out*, no information comes back. Serial ports, on the other hand, support full two-way communication such as that required in telecommunications.

Although printers can be driven through either the parallel or serial port (depending, of course, on whether you have a parallel or serial printer), parallel transmission is usually the first choice among PC users.

Parallel printers are usually less expensive, and data transmission over parallel cables is usually reliable in the 6–10 foot range of most printer cables. If you need to push your data farther, say, to a printer down the hall, a serial connection might be used because a serial transmission can travel longer distances without data degradation.

Get Physical

On most PCs you'll find a parallel port on the video card, and your printer is probably plugged in there. If you look at this connector on the back of your PC, you'll most likely see 25 small holes arranged in two rows.

Serial ports, also known as *Asynchronous Communications Adapters*, come standard on some PCs and are extra equipment on others. Serial ports come in two configurations, 25-pin and 9-pin. Both accomplish the same thing, but the 9-pin version is more economical in terms of space. Most of the pins in the 25-pin version are unused, so nothing is missing in the smaller connector.

Nine-pin serial ports are standard on AT-class machines, while 25-pin connectors were supplied with most XTs.

Most printer or modem cables that you'd use with a serial port are built with 25-pin connectors. To use these cables with a 9-pin port, you need a short adapter cable with a 25-pin connector on one end and a 9-pin connector on the other.

These pigtail cables, as they're called, are now widely available and relatively inexpensive.

More Serial

If you want to use additional peripherals with your computer but have run out of spare ports, it's fairly easy to add more by installing an I/O (Input/Output) card. For XT-class machines, a common I/O card includes a parallel port, a serial port, and a game port, as well as a clock/calendar.

I/O cards for AT machines include serial and parallel ports. If you need to add memory to your system as well, you can purchase a multifunction memory card, which includes spare ports along with sockets for additional RAM.

Where's the Mouse Hole?

If you plan to add a mouse to your system, you can buy either a serial or a bus mouse. The decision depends on your hardware setup. A serial mouse plugs directly into your PC's serial port. A bus mouse connects to a card that fits into one of the slots on your motherboard.

A serial mouse will often cost less, but it may tie up a serial port you plan to use for telecommunications or a second printer. The bus-/serial-mouse decision hinges on your future expansion plans and how many vacant slots you have inside your system.

More Ports

DOS was originally set up to allow access to three parallel ports (LPT1, LPT2, and LPT3) and two serial ports (COM1 and COM2).

As this proved to be somewhat limiting, support for two additional serial ports (COM3 and COM4) was added later. Be forewarned, though, that not all software or hardware is configured to access the two additional serial ports. PC

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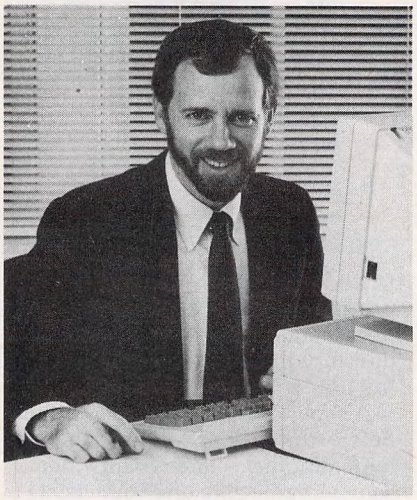

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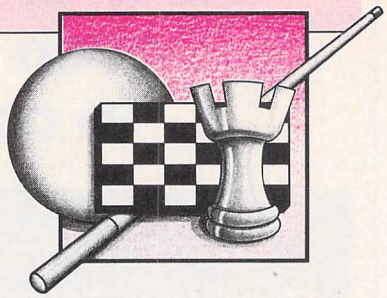

Some Call It Cheating

Harry Bee

If I'm going to play a game often, it has to have a game-save feature. It's a rare day that I can put together several hours at a stretch to play a game. Life is a busy enterprise, and game time—or time for anything else—comes in bits and pieces. If I can't save a game and get back to the same place, it had better be an extraordinary game, or it gets shelved.

Electronic Arts' *Kings of the Beach,* for example, is a simulation of professional beach volleyball that works well. Like the sport, it doesn't take itself too seriously. (It's hard to imagine getting dreadfully earnest over a sport that's played in bathing suits on the beaches of Maui and Martinique.) It's fun. It's challenging. It has a spirited overture when played on a Tandy or an Ad Lib board. And it rewards an advance to the next level with a full screen of graphics worthy of a *Sports Illustrated* swimsuit issue—which may be the only reason it's still in my games directory.

But after three months, I'm only at the third level, not because it's an especially difficult game, but because you have to win two out of three games in one sitting. A game runs 20 minutes or more. Three games is almost always more than I have time for.

Why not let you save the game in midmatch? Tell the truth. If you were to lose the first game, would you really save it and try to win the next two in a row?

Designers of simulations and role-playing games (RPGs) leave out the game-save feature because they're afraid you'll use it to replay a bad move. They argue that in real life you can't freeze a game in the second quarter, you can't call time in the heat of battle, and you can't bank your booty until you've come safely back to your guild hall or star base. If you forget that in *real life* most folks don't get to cast fireballs at hobgoblins, they're exactly right.

So, for the sake of leading us not into temptation, some good games become practically unplayable for those of us who have to do our gaming in bites and snippets.

Learning to Cheat

The situation is improving. Newer RPGs often allow a single save outside of the game's safety zone. It helps. As long as you can get to some saved position in the limited time you have to play, you can turn that opening into a useful game-save feature. Then, when you have an accident with a carefully developed character, it isn't necessarily terminal. Some call it cheating to meddle with the fundamental laws of a game world. I call it fair.

For instance, MicroProse's *Airborne Ranger* lets you play a Rambo-type character doing dangerous missions behind enemy lines. It's a good play. At the higher levels, the game gets very tense, and if you don't maintain your concentration, you won't survive.

So, I bring a character up through the ranks to major. I've got a good shot at making bird colonel in this campaign. At the moment, I'm wounded, but I only have to dash a few yards to the pumping station, set a charge, and then make my escape. Can do.

I set a diversion. It's as safe as it's going to get, and I go for it—just as my four-year-old runs into the room screeching, "Circe knocked me down!" Circe is an occasionally clumsy wolfhound, and my erstwhile major is a French fry, thanks to an enemy flamethrower. In the *Airborne Ranger* game world, there are no resurrection spells. Should I have to live with a dead ranger?

No. Whenever I play a game that doesn't let me recover from accidents like that, I simply go around the restriction. In other words, I cheat.

It's easy enough. After you first play the game, quit and look at the directory that the game is in. Most of the files will have old dates. But one will show the current date and time. Before you play again, copy that file under another name. Then, when something terrible and irreversible happens, you can give yourself another chance by restoring the original file from the copy.

You can automate the process. Here's the batch file that protects me from *Airborne Ranger* by saving the character status to a file called ROSTER.DAT.

```
@echo off
cd \games \ranger
if %1 == r goto restore
copy ROSTER.DAT SAFETY.NET
goto start
:restore
copy SAFETY.NET ROSTER.DAT
:start
ar
```

Start the program with an *r* after the batch file's name (ranger r), and it restores the last saved position. This technique should work with any game that lacks a reasonable game-save feature.

Little Bits

Text adventures never skimped when it came to letting you save a game; neither do the graphics adventures that may one day replace them. Sierra's *Space Quest III,* for example, provides a dozen or so saved positions at a time. The game's a romp. The wit alone is worth the trip to Pestulon.

Spectrum HoloByte's *Vette!* doesn't need a game-save feature. In this game, there are no promotions to earn—your best times are recorded in an arcade-style ten-best list. At 150 mph and more, you can take the complete tour of the streets of San Francisco in under 20 minutes, which is just right for the game's race-by-modem feature. PC

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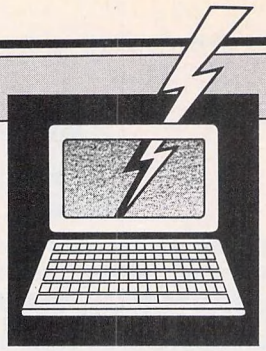


The Raging C

Tom Campbell

After literally years of raging controversy, the ANSI C standard has been ratified. ANSI, or the American National Standards Institute, sponsors a wide variety of standards committees for literally hundreds of products, from bicycle helmets to programming languages. The standards it brings forth have no legal force, but, because standards committees are generally made up of industry vendors and are subject to intense debate, compliance is usually high. Since many C programmers emerged from UNIX environments, where portability is king, the ANSI X3J11 report on C has attracted intense interest.

A few reasonable questions may come to mind. The most obvious is that if the standard passed only recently, why have so many C compiler vendors been advertising full ANSI compliance for the past two years or so? The answer is equally obvious: They jumped the gun. For example, virtually no one supplied the strftime( ) function, a formatted output routine for time- and calendar-related data. It's a sort of printf( ) for these quantities and is very handy, but it appears in nary a current implementation.

All compilers from major vendors now purport to be largely compatible with the ANSI standard; its acceptance is a *fait accompli*. The implications to you as a user are significant, and that's what this column is about. Chances are you aren't bothering with issues like portability or ANSI compliance at the moment, but you may be in for a nasty surprise if you decide to move to a new compiler or, heaven forbid, buy a Macintosh. And in fact, many evergreen C features, such as read( ) and open( ), aren't even in the ANSI standard! So, although most compilers do support such outdated features, you have no assurance they'll remain. Let this month's column serve as warning.

Brave New World

A small but significant change from Kernighan and Ritchie (K & R) C is the addition of some keywords and the subtraction of others. For example, asm, entry, and fortran may no longer be considered standard, although all three appear in many MS-DOS compilers. Most MS-DOS compilers also implement the keywords near, far, and huge as well. These are emphatically not ANSI-standard. They exist only to optimize code written for 80*x*86 machines.

What has been added is far more interesting. The const keyword modifies variable-allocation keywords and means that the object cannot be changed or optimized out by the program. Note that the implications stretch beyond direct modification of that variable: Using pointers to them as an aliasing technique is also invalid. For example:

```
main( )
{
  /* This value can't be changed. */
  const int i;
  int j, *pi;
  i = 99; /* Invalid */
  pi = &i; /* Invalid */
  pi = &j; /* Fine */
  *pi = 100; /* Also fine */
}
```

The volatile keyword means that you must assume some other program can change the data. This is meaningful, for example, in some multitasking environments where several different programs share some global memory and one program might write to that memory without the other program's knowledge.

The enum keyword is useful for the creation of lists of related constants instead of the more awkward, inconvenient, and error-prone method of hand-coding #defines. For example, instead of this:

```
/* Keyword list */
#define AND    0
#define ANSI   1
#define ASK    2
#define BLACK  3
```

you'd use enum in a more natural setting:

```
/* AND == 0, ANSI == 1, and so on */
enum { AND, ANSI, ASK, BLACK };
```

The value of the first element in an enum statement is 0. The value of each successive element is automatically increased by 1, but you may circumvent this process by inserting an assignment operator and a value:

```
enum { LowMem = -1, /* RESERVE 0 */
       NormalMem = 1, FullMem };
```

In the example above, 0 is skipped and FullMem equals 2.

The void keyword has too many uses to be covered adequately here, but one of them is so strange to programmers who started in other languages that it bears repeating. C was originally designed to be a language where every subroutine returned a value; that is, everything is a function. If you started out as a Pascal programmer you may have realized with shock that there was no such thing as a true C procedure call. Until the ANSI standard, every function returned a value, period. It was easy to forget this, however, because, unlike Pascal, C function declarations did not need to define an explicit return value. In C, if you define a function without a type, it's assumed not to be a procedure but a function returning an int. Even such commonly used library functions as printf( ) and puts( ) return values. This also means you can do the following:

```
int RetValue;
long V;

/* This actually returns an int. */
ShowValue(long Val)
{
  printf("%ld", Val);
```

```
}
...
/* RetValue has junk. */
RetValue = ShowValue(V);
```

The function ShowValue( ) has no explicit return statement, yet the C compiler will pop a value off the stack afterward and assign it to RetValue. So, two decades after Pascal was invented, the ANSI standard has finally implemented the void keyword, which originated in C++ and lets you create a true procedure. By inserting a void before the identifier ShowValue in the example above, you would render the assignment of ShowValue to RetValue illegal. It would be semantically equivalent in Pascal to assigning a PROCEDURE to a variable of type INTEGER, which is obviously an error.

The void keyword has many other ramifications, because it may be used as a qualifier to pointer types as well. The most useful of them is that a void pointer may point to anything without compiler warnings. Previously, pointers to char were used for the same purpose, but this could cause ugly surprises when you forgot it was indeed a char pointer. Void pointers offer a generic mechanism that's handy for dynamically allocated objects and objects that can change size.

Files in the Stream

File I/O has made vast but subtle changes in ANSI C. If you use file handles and such obsolescent library routines as open( ) and read( ), instead of using file descriptors, fopen( ), and fread( ), pay close attention. Most popularizers of C have really missed the boat on these developments, so if you're trying to teach yourself from a book right now, pay attention as well.

UNIX treats almost all devices attached to the computer as files. You're probably aware that MS-DOS does the same thing, even going so far as to regard the screen as a sort of printer and the keyboard as a device that can take input from a file. That is, the commands DIR, DIR > PRN:, and DIR > DIRECT.TXT are all indistinguishable to one level of MS-DOS, in that the directory listing is sent to a "standard output device," which is the screen in the first case (try DIR > CON:), the printer in the second, and a text file in the third.

Files in UNIX are thought of as nothing more than streams of bytes, the source of which is only of concern to device drivers, not the operating system itself. The original K & R book alluded to this but provided weak and sometimes nonexistent guidelines for the implementation of this model. With everything treated as a file, the concept of file handles was introduced. Because you can have a file with the same name in different subdirectories, using the filename as a unique descriptor of the file was insufficient. File handles were thus born; originally they were integers.

The cracks in this scheme began showing as soon as UNIX caught on. For example, what's a byte? On some machines, it was 7 bits (that's why the ASCII character set only goes from 0 to 127, and some vendors even complained that 7 bits was 1 bit too many!); on others, 8; and on others, 9 (8 bits and a parity bit that some programmers would use, disgustingly enough, to store values when memory was sparse). And if your machine has a 32- or 64-bit word size, sometimes splitting up that word into four bytes costs too much in time to be worth the space saved. Therefore, some implementations would treat a stream as a sequence of 32-bit words with a single char value stored every four bytes, whereas others would pack the four-byte word with four chars.

This all got to be too much and, apparently unbeknownst to people who write tutorial books about C by stealing from K & R, the FILE descriptor was developed several years ago on UNIX systems. It was implemented shortly thereafter in most MS-DOS compilers, but its value was not widely known by users of smaller systems. Since overhauling functions like open( ), read( ), and write( ) would result in a compatibility nightmare, the new, improved versions got the old names preceded by an *f:* fopen( ), fread( ), and fwrite( ). We now refer to the older routines, which also include creat( ), lseek( ), and tell( ), as low-level functions, and the new ones, which include fseek( ), ftell( ), fflush( ) and quite a few more, as stream I/O functions.

This is too vast a subject to cover in detail here, but I suggest you do what I did: Get a list of the ANSI-compatible functions, make sure they're all implemented in your compiler, and then cross-check by looking up all the file I/O routines you've been using in the ANSI reference. Like me, you'll probably be in for a rude awakening. (Note that all examples in previous columns have conformed to ANSI standards.) The benefits extend beyond portability. The new file functions give you a much broader range of actions, better type checking, and much better performance.

Memories

Pointers and dynamic memory allocation went through a metamorphosis similar to that of file I/O. K & R C was developed on true 16-bit machines where the 0–65535 values for an unsigned int corresponded often enough to the computer's addressable RAM that ints were often used as pointers. Even though K & R cautioned against regarding ints and pointers as interchangeable, many textbook authors and compiler vendors chose to disregard their advice. In small-model programming on a PC, where data space is 64K or less, you could do the same thing without too many embarrassing mistakes. A lot of public domain code that's still floating around looks clean at first glance but employs this questionable practice. Depending on the quality of your compiler's type checking, it either won't compile in medium or large models or, worse, compiles but then dies unaccountably when it's run. For example:

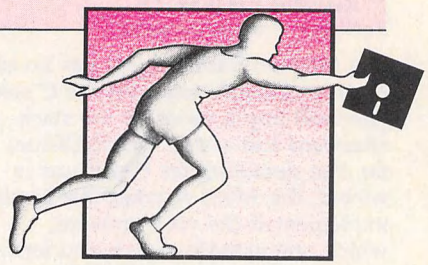
```
char *NextWord(char *Input)
{
  int WordPointer;

  /* May work in small model, but don't
do it! */
  WordPointer = Input;
  ...
}
```

The above example should either result in a stern warning from your compiler, even in small model, or it should not compile at all. Since an unsigned integer on the PC can only reach as high as 65535, what would you do if you wanted to make use of all 640K of your compiler's RAM? On an 80286 in protected mode, the word size is still only 16 bits, but the addressable RAM is 16 megabytes. And on an 80386, well, it's not even worth bringing up.

You may be versed in the use of dynamically allocated memory as a way to get around array and word-size limitations. Even here the strict use of pointers where pointers should be used is necessary, because the heap manager returns a 32-bit pointer to memory in many memory models. And speaking of which, be aware that alloc( ) is dead. Although your compiler may support it, use only the ANSI-standard malloc( ) instead.

K & R were somewhat apologetic in their discussions of alloc's implementation because the concept of a void pointer hadn't been worked out. Truly portable code that used dynamic memory allocation was impossible because those functions treated memory as chars. Since chars could be anything from an 8-bit byte to a 16-bit word to a quarter of a 32-bit word, depending on the machine and implementation of C, you never knew when word size or alignment problems could sneak up and bite your code in the neck. PC

UP AND RUNNING



Working Smarter, Faster, and Better

Robert A. Moskowitz

Everywhere you look, doing business electronically is becoming big business, even for small businesses.

Although the paperless office has yet to become a reality, more and more business owners and managers are recognizing the power of the personal computer to collect and store standardized information (the very same job that led to the thousandfold proliferation of paper forms in the first place). Now they are beginning to handle much of this information electronically rather than on paper and are realizing enormous benefits.

In the purest sense, an electronic form is the front end of an automated system for capturing, editing, routing, processing, tracking, storing, and printing or otherwise distributing selected information.

While today's forms-oriented packages don't do everything they should, they do provide enough forms capabilities to greatly simplify and speed up your everyday business operations.

Checkpoint Charlie

In theory, an electronic form should automatically validate data as it's entered (or at least check to make sure a dollar amount isn't entered where a date should be). The computerized form should also provide plenty of onscreen help and descriptive instructions, not just ominous blanks waiting to be filled in.

The more attractive and productive onscreen forms also include the same lines, boxes, multiple check-offs, and special symbols we've found so helpful on our paper-based forms.

Once you've entered the data, the electronic form should offer significant productivity improvements. After all, most data written on paper forms is quickly punched into a computer for processing. With an electronic payroll check or deposit slip, it's already in there.

This is precisely where today's electronic forms-handling software fails to deliver on its promise. You can find some great forms-making software packages and some good forms-filling packages. But the packages that process the information contained in the electronic forms are far behind.

Although they're far from perfect, software for using electronic forms has matured enough to provide workable solutions with major advantages over the equivalent paper-based forms.

Form Fitting

In general, there are three classes of electronic forms software: form makers, form fillers, and applications with form processors.

Form makers, like *Per:FORM* (Delrina Technology, 15495 Los Gatos Boulevard, Los Gatos, California 95032; $294.95) and *FormTool* (BLOC Publishing, 800 Southwest 37th Avenue, Coral Gables, Florida 33134; $95.00), let you draw a new form on your computer screen and print it.

This approach saves time and money and lowers the usual hurdles in forms creation and duplication. But after printing the new form, people still fill it in and process it manually.

Form fillers go one step farther. They usually provide many of the same form-drawing capabilities as form makers. Some programs, like *TrueForm* (Adobe Systems, 1585 Charleston Road, Mountain View, California 94039; $395), let you scan your existing sales order or purchase forms and place them directly into the computer. Once you've converted the form to bits and bytes, software such as BLOC Publishing's *FormFiller* ($149) captures and stores the data you enter for each form. You can print the data onto a preprinted form or print the data and the form itself in one pass.

For larger forms like policy manuals and employee handbooks, the information need not be printed at all—anyone can read it right on the screen.

Of the three types, forms-processing software is the most sophisticated. Unfortunately, it's hard to find on the PC. Instead, you may have to use a database, like *Paradox* or *dBase*, to perform the data processing you need. You simply program your database to display the necessary forms instead of the regular data-entry and output screens.

Signed, Sealed, Delivered

One of the major gaps in electronic forms software is still the simple signature. We're used to signing or initialing every paper form as we fill it in or process it. (Some usually reliable sources suggest that Datadesk, a pioneer in keyboards and human-interface technology, is close to releasing a device that will let you directly capture your handwriting, including your signature, on a form or document.)

So far, few computers have the hardware and software they need to capture initials or signatures electronically. They make do with passwords and access restrictions instead of signatures, but it's not the same.

Another problem is creating the electronic equivalent of multipart forms. With paper forms, each part usually goes to a different place for a different type of processing. Putting multiple routes and processing routines into an electronic forms-processing system is expensive. Fortunately, electronic forms eliminate much of the need for data redundancy, because the electronic forms can be in many places at one time.

Even with today's limitations, putting paper-based forms on computers offers major advantages in productivity and cost savings. To get up and running, start looking for places to use electronic forms in some or all of your operations. PC

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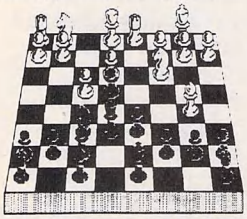

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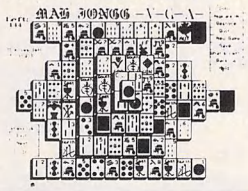

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WINDOW PRO (1613, 1614/2 disks) Create windows and titles for menus, etc.
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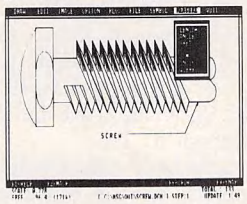

CHARTS UNLIMITED (GRA16) Complete system for flow charts: organizational, electrical, etc., with symbols.

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PC-CALC+ v1.0 (512-514/3 disks) Jim Button's famous Lotus clone (2 FD or HD)
PIVOT v1.01 (516) Prints Lotus or As-Easy-As files sideways.

ACCOUNTING/FINANCE

MARKETCGA v2.2 (BUS17) Analysis on stocks, funds, etc. EGA ver. is **BUS 16** (CGA)
AMORTIZE (BUS113) Calculate, print loan amortization schedules.
TICKLEX (BUS62) Appointment calendar with reminder, alarm, timetable, etc. (HD)
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EXPRESS CHECK v2.06 (786) Checking account with running balance, monthly reports, etc. Prints checks.
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CATALIST (2059, 2064/2 disks) Mailing list manager. Prints labels, reports.

NOTE: Minimum program requirements are in parentheses at the end of descriptions. FD=floppy drive, HD=hard drive, CGA=at least CGA, or better (for example, EGA or VGA).

FAMILY TREE (2201) Create files, genealogical reports.
LOTTO PROPHET v2.7 (2364) Best lotto program around.
PC-DESKTEAM (2603) Desktop organizer. Many features!

TELECOMMUNICATIONS

TELIX v3.11 (1161-1162/2 disks) Total package. Supports baud rate to 115,200 (modem, 2 FD or HD)
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PROCOMM v2.43 (1159) Outstanding modem software.

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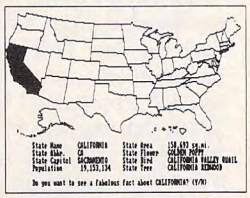

PC FASTYPE v3.01 (241) Touch typing instruction with WPM, accuracy, etc. (CGA)
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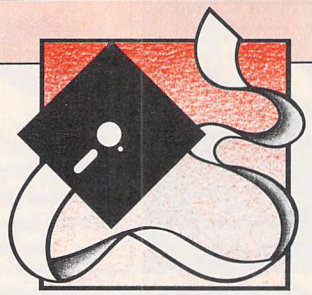


Worms, Quakes, High-Tech Bricks, and More

Alan R. Bechtold

Things are not going well at MiniScribe. Once a supplier of disk drives to IBM, the company hit hard times in 1985 when Big Blue decided to manufacture its own drives. Q. T. "Dr. Fix-It" Wiles, well known as a corporate turnaround artist, was called in to save the day. Wiles seemed to have turned the trick—until the *Wall Street Journal* reported on September 11, 1989, that corporate pressure to show increased sales at any cost had forced MiniScribe management to turn to creative bookkeeping.

The *Journal* report alleged that record-breaking sales figures for the past year were the result of listing disk drive shipments to distributors as sales, reshipping stockpiled defective inventories, and, at least once, shipping bricks instead of drives. Investors, the SEC, and internal auditors are taking a closer look at the company.

Wiles denied any knowledge of wrongdoing, but he has left the company and now resides in near-seclusion, refusing to comment on the situation. Most of the company's top management also left quickly.

Richard Ritenburgh, MiniScribe's new CEO since February 1989, now admits that the company might be forced to file for Chapter 11 bankruptcy protection. Results of an initial audit indicate that the company shows a negative net worth of $88 million. Meanwhile, MiniScribe is busy trying to settle shareholder lawsuits out of court.

But hope springs eternal at MiniScribe. Ritenburgh said the company should have $500 million in sales for this year and is poised to release a new one-inch, 80-megabyte drive that should sell well. Industry analysts, however, doubt the new products will be competitive long enough to pull the company out of the fire.

Down, but Not Out

Leading Edge has sprung back from bankruptcy reorganization with a bang, introducing the company's first new product in over a year. The new Leading Edge Model D/86, an Intel 8086-based, IBM Model 30–compatible microcomputer, was officially unveiled at the Fall COMDEX show. Equipped with either dual 3½-inch floppy disk drives or a 30MB hard disk and VGA, its suggested retail price starts at $1,295.

The company also announced that it has joined with the Washington, D.C.–based ASCII Group, which is expected to funnel more than $10 million of Leading Edge products to its 430 dealer members in the coming year.

Leading Edge, 225 Turnpike St., Canton, MA 02021

After the Quake

The earthquake that hit San Francisco resulted in unprecedented tragedy and destruction for the area and the computer industry located there. John J. Anderson, a 33-year-old senior editor at *MacUser* magazine, and Derek Van Alstyne, a 22-year-old technical editor and programming expert for several *MacUser* departments, were both killed when the wall of a building collapsed on their car. They were driving back from a meeting with officials at Micromind Software.

Tragedy often brings people—and companies—together. In the midst of the earthquake's devastating effects, Silicon Valley corporations pulled together and donated money and resources to help with the clean-up and disaster relief.

Two days after sustaining millions of dollars of damage in the quake, Hewlett-Packard reported that most of its Bay Area facilities were back in operation. The company also announced that it would donate $100,000 to the American Red Cross for quake-recovery activities and offer free remote support and on-site damage assessment for all of its Bay Area customers.

Similarly, WordStar International donated $15,000 to the Red Cross on behalf of its employees. Micro 1 offered free diagnostic evaluation of IBM-compatible personal computers that were damaged by the quake or the resulting power failure, and it offered to repair damaged systems with no charge for labor.

Up to $100,000 of free strategic mapping software—*Atlas Graphics* for PCs and *MapMaker* for Macintoshes—was offered by San Jose–based Strategic Mapping to any nonprofit or governmental agency involved in quake-relief efforts. The company's offices are located just 15 miles from the epicenter. Members of the Japanese Business Association of Southern California pledged a whopping $4 million to various relief groups assisting in the aftermath.

As the Worm Turns

Computer users worldwide held their collective breath as the deadline for activation of the Friday the 13th virus, otherwise known as the DataCrimes Virus, passed without a major incident. According to a report in the October 18 issue of *USA Today*, a European computer hacker penetrated a NASA computer network and placed a worm (a buried programming message) into systems operated by universities and government officials. The worm, however, was not destructive and was in no way related to the expected international virus attack.

With all the talk about virus attacks, software to protect computer users has sold well. Empirical Research Systems released a new program called *Virosoft*. Sold as shareware for $20, the program checks to make sure there have been no signifi-

cant changes to the software being checked. The company claims it can detect both known and new viruses.

Cate's Cure, written by Rikki Cate under contract to *Personal Computer* magazine of the Netherlands, was specifically aimed at DataCrime II. It can not only locate the virus, but also remove it and repair any damaged programs it has infected. Even IBM released a program, *Virus Locator*, that can be downloaded from CompuServe. Apparently, the expected virus only hit systems that were already protected, as no major infections surfaced.

Bullheaded

Zenith Electronics surprised industry insiders and customers alike when it announced the sale of its computer division. Although Zenith's entire line of PCs, including the recently introduced MinisPort laptop computer, have been enormously successful, the

Zenith sells its computer division.

company says it will instead concentrate its resources on HDTV (high-definition television) and color TV. The fact that the company is $500 million in debt and was offered $635 million for its computer business by the French conglomerate Groupe Bull, might also have something to do with the decision. At press time, the sale still had to be aproved by Zenith shareholders.

80486 Flunks Math

It's hard to imagine a computer chip capable of flunking math, but Intel's most powerful computer chip, the 80486, had problems in that area recently. According to the *Wall Street Journal*, two flaws were discovered in the chip's floating-point unit. These flaws caused the chip to occasionally give incorrect answers to sophisticated calculations. Only specialized operations, such as high-end CAD and scientific calculations, were affected, and Intel says it has already corrected the problem. Updated 486 chips are now shipping.

New Management

The rumor that Borland International would drop its popular *Turbo Basic* BASIC compiler was bad news to the 100,000 satisfied buyers of the program. Then came the welcome news that Borland is transferring future development rights and the rights to publish future versions to its original developer, Robert Zale. The good news didn't stop there. Zale has already reached an agreement with Spectra Publishing of Sunnyvale, California, to publish the new version of *Turbo Basic* (2.0) in December, under the name *PowerBasic*. Set to retail for $109.95, *PowerBasic* will be, according to Zale, "the fastest and highest performance BASIC compiler on the market." Spectra Publishing will market the new *PowerBasic* through traditional software retailers and distribution channels and will offer full technical support. Who said BASIC was dead?

Borland International, 4585 Scotts Valley Dr., Scotts Valley, CA 95066

Spectra Publishing, 1030D E. Duane Ave., Sunnyvale, CA 94086

Lite'n Up

Software publishers have discovered a large market that wants their products in smaller and easier-to-use versions. *PC-Write Lite* is a new and simpler version of Quicksoft's popular *PC-Write* word processor. In the *Lite* version, the company has removed some of the complexities of *PC-Write*, such as advanced formatting and mail merge, and has made the program faster. The new version retails for $49, which includes a year of technical support. You can also buy the disk alone for $12 and the manual alone for $29.

Quicksoft, 219 First Ave. N #224, Seattle, WA 98109

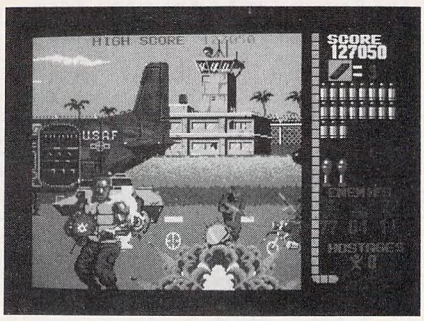
Dueling Deficits

The trade deficit between the U.S. and Japan is a long-standing economic problem, but there's one segment of American business—the software industry—where the tables are turned the other way. Japan is buying a lot of American computer software. A recent report from Sentry Market Research indicates that the Japanese market for software will grow by nearly 70 percent within the next 12 months—from $5 billion to more than $8.5 billion. By contrast, the much larger U.S.–packaged software market is projected to grow by only 15 percent, from $20.1 billion to $23.1 billion.

Much of the software sold in Japan will be produced by American software companies that go to the trouble of understanding the language and culture, translating their documentation into Japanese, supporting the Japanese character set, and providing a lot of local support. Success also depends on overcoming the cultural prejudices Japanese managers have against *canned* software solutions. Software that's more or less generic in nature, makes a system run more efficiently, or helps developers become more productive should do well.

Counterattack

Don't count the Japanese completely out of the American software market—not if Taito has anything to say about it. Just 18 months after starting up its North American operations, Taito Software has reached $50 million in annual sales. Taito is the publisher of such popular hits as *Operation Wolf, Bubble Bobble, Sky Shark,* and *Renegade*—all conversions of hit arcade games originally developed by its parent company, Tokyo-based Taito, the world's largest arcade-game producer.



Taito is an overnight success.

Taito Software president, Alan Fetzer, attributes the company's success to the 35-year experience of its parent company, quality entertainment software products, aggressive marketing, solid financial resources, and skilled and experienced managers. What's the Japanese word for *overnight success?*

IBM's New Agenda

Confident it has improved on the software category literally created by Lotus's *Agenda*, IBM Desktop Software is now shipping *IBM Current*. *Current* is a personal information manager (PIM) program designed to help you organize, relate, and retrieve text and graphical data. *Current* works with customizable categories and connections, for specific applications such as sales-contact management, people management, time-and-expense billing, and project coordination. The software can automatically establish

links between related information that can be displayed on the screen or sent to a printer with the built-in report generator.

The program also includes an on-screen graphical representation of a color-coded calendar, an address book, and color-coded Gantt (time line) charts that offer quick overviews of projects and tasks. There's also a limited letter writer, a spelling checker, and an automatic phone dialer. You can use the mail-merge feature to combine your letters with the addresses in the software's database and create automatic logs of letters and telephone calls. For 286-based IBM PCs and compatibles with a hard disk and at least 640K of memory, *Current* is set to retail for $395. Expect more entries into this new and growing category of software in the months ahead.

IBM Desktop Software, 472 Wheelers Farm Rd., Milford, CT 06460

Comforts of Home

Keeping your hands on the wheel and your eyes on the road might be harder from now on. PowerTrip is a new device from a company called Zirco that converts electricity from an automobile's cigarette lighter into normal

Use your computer in the car with PowerTrip.

AC house current. Zirco claims the device delivers 100 watts of continuous 115-volt AC power and can be used to power computers, FAX machines, video recorders, typewriters, calculators, and battery chargers.

Zirco, 10900 W. 44th Ave., Wheat Ridge, CO 80033

Pixelated

A new high-contrast LCD Video Graphics Array (VGA) display option is now available for the GRiDCASE 1500 Series battery-powered 286 and 386 laptop computers. The built-in VGA feature allows laptop users to display text and graphics in a deep blue color on a bright background using a new film-type technology applied to a supertwist LCD panel. This reportedly eliminates the viewing problems ordinarily associated with standard supertwist LCD technology.

In addition, the new display decreases the smearing inherent in LCD panels during animation, has a faster refresh rate, and provides a flicker-free display. GRiD has also redesigned the backlight circuitry, providing an overall brighter screen. When connected to an external VGA-compatible monitor, the laptop is capable of displaying 256 colors with the standard 640 × 480 pixel resolution.

The new display will be available on GRiDCASE 1500 Series Laptops and as a factory upgrade to current GRiDCASE 1500 laptops beginning in December. The company will continue to offer the original 640/400 LCD and gas-plasma screen options.

GRiD Systems, 47211 Lakeview Blvd., Fremont, CA 94538

Hollywood Hotline

Now movie fans and couch potatoes can check their entertainment facts 24 hours a day, 365 days a year. *Boxoffice Online* and *OnVideo* are part of a new online service called *Take 3* that's designed to be the most comprehensive source of entertainment information.

Boxoffice Online is the electronic version of *Boxoffice Magazine*, the oldest continuously published magazine of the motion-picture industry. It provides instant access to the magazine's most popular features. These include reviews of new releases and hundreds of previously released films, a calendar of film festivals and events, a searchable database of all the Academy Award nominees and winners, and sneak previews of films before they are released.

Online covers the video side of movies with listings for virtually every videocassette released to the home market. It also includes a 10,000-record Personalities Database that cross-indexes stars and directors whose films appear on tape. *Take 3* costs $5 a month for individuals and $10 a month for businesses. Have your modem call their modem at (602) 482-1001 for a free online test drive.

Better Mousetrap

It's finally here. Microsoft's *Flight Simulator* version 4.0 lets you design and test-pilot a personal fleet of customized jets, prop-powered planes, and sailplanes by simply altering the measurements of the basic aircraft provided in the program. A model of the Schweizer 2-32 Sailplane is also included. A new weather generator simulates random weather patterns, introducing unpredictable wind changes, storm fronts, and cloud buildup and dissipation. Boeing 767s, F-14 Tomcat fighters, and other air traffic have been added to the in-flight dynamic scenery, and a new approach lighting system and air traffic control display add to the realism when taking off and landing. The program requires an IBM PC or compatible with 384K and a CGA, EGA (with 256K display memory), MCGA, VGA, or Hercules graphics adapter. It retails for $59.95.

In additional news, Microsoft announced it has successfully obtained a patent, U.S. Patent No. 4866, for internal mouse technology. The patent covers the technique of connecting a mouse to a personal computer through a standard PC serial port without the need for an external power supply. Microsoft already held a patent on the bus mouse, which requires the user to install a special circuit board (or card) into one of the PC's expansion slots. The title of the new patent, in case anyone really needs to know, is "Power Supply for a Computer Peripheral Device Which Positions a Cursor on a Computer Display." A mouse, by any other name.

Microsoft, 16011 NE 36th Way, Box 97017, Redmond, WA 98073 PC

Alan R. Bechtold edits Info-Mat Magazine, *an electronically distributed news weekly published by BBS Press Service.*

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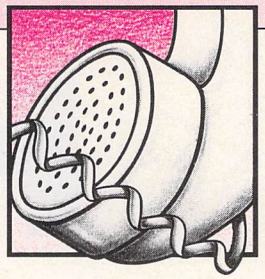

Your Information Hot Line

Editors & Readers

Everyone knows that crickets and giraffes have environments, but your PC has an environment, too. It's a special area in memory that stores important information DOS needs to reference.

The trouble with the DOS environment is that its original setting is too small—a sparse 160 bytes. If you have a long PATH and several variables, it's easy to exceed this limit. But there's a fix.

With the SHELL command, you can tell DOS versions 3.0 or higher you want a larger environment, and you can specify how large to make it. SHELL goes in your CONFIG.SYS with the following syntax:

SHELL=*drive:**path***COMMAND.COM /E:***size** **/P**

If you're using DOS 3.0 or 3.1, *size* has to be expressed in 16-byte paragraphs, with a maximum value of 62 paragraphs or 992 bytes. With DOS 3.2 or higher, you specify *size* in bytes with a top end of 32,768.

Here's the command to enlarge your environment to 512 bytes if you use DOS 3.2 or higher and you have a hard disk:

```
SHELL=C:\COMMAND.COM /E:512 /P
```

The *P* parameter tells the system to run AUTOEXEC.BAT after CONFIG.SYS, so be sure to include it. Although you can make your environment larger, 512 bytes is a reasonable upper limit.

— *Clifton Karnes*

Key Clash

If you use *WordPerfect* 5.0 and *MemTool* (November 1989), you may have noticed that you can't enter a hard page (Ctrl-Enter) without activating *MemTool*. You can solve this problem by renaming the keys in *WordPerfect* and changing the hard-page command to another key (see the *WordPerfect* manual for information on altering your keyboard layout). Make sure you unload *MemTool* first. You have to use Ctrl-Enter when you're redefining the key.

— *Carol Gehl*

Easy Formatting

Here's a modification to the batch file presented last month that automatically formats a disk in a high-density 3½-inch drive as a 720K disk. I wanted to be able to format disks in both 3½- and 5¼-inch high-density disk drives as either high- or low-density. After some modification, I ended up with XFORMAT.BAT:

```
ECHO OFF
IF x==%1x GOTO Syntax
IF x==%2x GOTO Syntax
IF %1==a: GOTO A
IF %1==A: GOTO A
IF %1==b: GOTO B
IF %1==B: GOTO B
GOTO Syntax
:A
IF %2==L GOTO ALow
IF %2==l GOTO ALow
IF %2==H GOTO AHigh
IF %2==h GOTO AHigh
GOTO Syntax
:ALow
FORMAT A: /4 %3 %4
GOTO End
:AHigh
FORMAT A: %3 %4
GOTO End
:B
IF %2==L GOTO BLow
IF %2==l GOTO BLow
IF %2==H GOTO BHigh
IF %2==h GOTO BHigh
GOTO Syntax
:BLow
FORMAT B: /N:9 /T:80 %3 %4
GOTO End
:BHigh
FORMAT B: %3 %4
GOTO End
:Syntax
ECHO This command formats floppy
drives only.
ECHO Syntax: XFORMAT (A: or B:) (H or
L) [/s /v]
:End
```

The syntax for using the batch file is XFORMAT (A: or B:) (H or L) [/s /v]. The parameters in the square brackets are optional. Thus, to format a disk in drive B as high density, I type XFORMAT B: H (include spaces) instead of the more cryptic FORMAT B: /N:9 /T:80.

This batch file is only intended for systems with hard drives. In addition, the batch file is tailored to my system—it assumes that drive A is a high-density 5¼-inch drive and drive B is a high-density 3½-inch drive. If your floppy drives are different, the batch file must be modified to account for the differences.

— *Jim Fuchs*

Printing in Style

Here are some suggestions to help you get the best quality printouts from your printer. For a dot-matrix printer, invest in a box of high-quality form-feed paper. Save this special paper for your final printouts and use less expensive paper for everything else.

Next, buy a new ribbon and use it a few times. Then place it in a zip-lock bag, and save it with your better-quality paper.

You also need two kinds of paper for your laser printer—an inexpensive brand for everyday use and a more expensive brand for those special occasions.

Finally, if your printer doesn't print as dark as it once did, clean your printer according to the instructions in your manual. A simple cleaning often cures a muddy or blurred printout.

— *David English*

If you have an interesting tip that you think would help other PC users, send it along with your name, address, and Social Security number to Hot Tips, COMPUTE!'s PC Magazine, *P.O. Box 5406, Greensboro, North Carolina 27403. We'll pay $25—$50 for each tip we publish.* PC

High-End Word Processors

With power to burn and features galore, one of these four heavyweights may be just the right power platform for you.

In 1971, Wang Labs introduced a small-screen workstation, called the Wang 1200. It was a remarkable achievement, storing and retrieving 133,000 characters per file from a cassette tape. A few simple editing and formatting commands were included in what might well be considered the first computerized word processor.

Nineteen years later, we find a crop of high-end word processing software that reveals an almost startling variety of complex options. They can import graphics, spreadsheets, and database material; turn out professional-quality reports; switch symbols and spell-check between languages; automatically generate indexes and tables of contents; and show ten finished pages simultaneously onscreen. There's little resemblance between these high-powered writing tools and their distant Wang ancestor.

Great Expectations

High end is a bit of a misnomer when it comes to word processing packages, because the average $500 price tag is a bit deceptive. A glance at almost any mail-order ad will show that the four programs under review here *(Microsoft Word* 5.0, *WordPerfect* 5.0, *WordStar* 5.5, and *XyWrite III Plus)* retail for less than half their announced prices, enabling them to compete successfully with midlevel products.

If the price of these powerful text crunchers is about the same as a midlevel program, why would anyone, then, want a midlevel word processor?

There are two reasons: Midlevel programs generally use less space on a hard drive, and they are usually simpler and require less time to master. (Borland's *Sprint* is an exception to this rule.)

The high-end products in turn offer three things: elaborate features, considerable speed, and a substantial investment in tools designed to soften the steep learning curve.

Separately, each of these three qualities helps define the best packages from the also-rans; together, all three establish the cutting edge.

Feature Fest

This is the arena where most high-end products fight it out. Each attempts to offer a single, unified package crammed with every desirable feature under the sun—and a few others that nobody else has.

Samna+IV, for instance, has an integrated database of considerable sophistication. *Mass 11* is an engineer's dream, providing scientific and mathematical symbols galore. *XyWrite* offers a diversity of features with speed untouched by the competition—a favorite among editors. *NotaBene*'s linguistic flexibility extends to an add-on Hebraic module, which will generate text (and spell-check) right to left. And *Microsoft Word* and *WordPerfect* are both moving swiftly into the desktop publishing arena.

There is only one sure winner in this combat: the user. Intense rivalry between the software manufacturers translates into new features with frequent upgrades, and features offered by one company are instantly copied by the others.

Raw Speed

Word processors have simplified the task of writing and compiling text, which means it's easier than ever before to generate longer, more complex reports. This has created a need (especially in office and classroom environments) for faster word processors that can handle very large files. As most office workers can tell you, nothing breaks a chain of thought like the go-to-end-of-data command that becomes a slow trip down Infinity Lane.

No list of features, however long, can compensate for the stress caused by a program's sluggish response time. Conversely, at least one high-end word processor—*XyWrite*—has built its empire on good features wedded to an extremely fast engine.

Learning Curves

As word processors become more complex, they become more difficult to learn. The average user doesn't want a word processor that requires a degree in quantum mechanics. And no one except a programmer likes to cuddle up at night with a copy of a word processing manual that's the length and breadth of *Crime and Punishment*. After all, you're buying a word processor to write with, not to read about.

Most publishers of complex word processing software have responded in timely and varied fashion to the need for programs that are easier to learn. Several, including *Samna+IV*, *Microsoft Word*, and *WordStar* 5.5. have developed effective on-disk tutorials. Others, such as *WordPerfect* and *Sprint* incorporate well-written tutorial manuals. And *XyWrite*, with its elaborate command pseudolanguage (sometimes referred to as "demonic mnemonics"), has recently issued an upgrade including simple, English-based menus.

The four programs reviewed here are outstanding members of a large group of outstanding high-end products. Each takes a slightly different approach to features, editing, output, and learning, and each has a reputation for power and quality. If you're interested in taking the plunge into the world of hot text power tools, one of these programs should fit you like a glove.

— *Barry Brenesal*

Microsoft Word 5.0

When version 5.0 of *Microsoft Word* made its debut, thousands of users celebrated. Improvements and new features made this excellent word processing program even better.

Loyal users have always found *Word* to be a powerful program with a friendly interface. Pressing Esc pops up a series of interlinked menus that control the program's long list of editing and formatting features. *Word*'s macros cut complicated tasks down to size, while its excellent tutorial lessons and manuals ease the learning curve. *Word* even lets you access tutorial lessons while you use the program. Full mouse support and a multitude of shortcut keys top off the program's power.

Word's graphic screen is famous. It displays character formats, like italics and boldface, as they will appear when you print. And easy page formatting and outstanding printer support are part of *Word*'s appeal. None of those features are gone in *Word* 5.0, but Microsoft has added a collection of new features to the program that make it even more powerful.

Most impressive is *Word*'s new graphics integration. You can import graphics files in a wide range of formats, including PCX, TIFF, PIC, and others. A handy utility lets you capture other graphics images for use in your documents. Graphics can be sized and positioned anywhere on the printed page by using a simple menu. Even sections of text can be precisely positioned. Naturally, text automatically wraps around any box or graphic.

Word's macros cut complicated tasks down to size, and its excellent tutorial makes learning easy.

What's more, you can surround any part of a document with borders and lines with a few keystrokes. Boxes containing graphics or text can include background shading for extra emphasis. Adding captions is easy.

Word has always been able to handle multiple columns. Version 5.0 now lets you see and edit your columns side by side on the screen. Switching between visible columns to a faster, single-column display is just four keystrokes away. (In the multiple-column display, graphics appear as empty boxes.)

Once you've designed your document, you can use the new page-preview mode to see your pages. In either the single- or double-page mode, *Word* shows you just how your final printout will look, complete with graphics. You can't edit in the preview mode, but a single keystroke returns you to the editing screen.

The new Bookmark feature lets you mark spots in a document for reference. Using this feature, you can even link sections of multiple documents, updating changes automatically. You can also add notes to your documents. One command jumps to your mark or note. *Word* can even save documents automatically at intervals you choose.

Many features were improved with this release. The spelling checker is much faster, and it shows spellings in context. Repagination is now automatic. This slows down editing, but you can disable the

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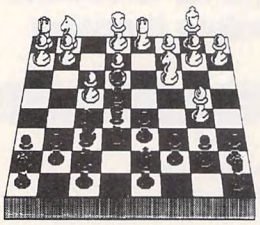
STRIKER (110) Fly helicopter against enemy (CGA)
TWO BIT POKER v2.0 (172) Just like the casino poker machines in Vegas (CGA)
STARLORD (GAM95) Play Star Trek on your PC (CGA)
DRACULA IN LONDON (GAM94) Great graphics game based on novel (CGA)
DND v1.2 (119) Like Dungeons and Dragons.
ROUND 42 (120) Like Space Invaders. 42 levels (CGA)
MONOPOLY (169) Great color and sound (CGA)
BRIDGEPAL (171) Contract or rubber bridge, w/tutorial.
SPACEWAR (158) Using phasers, photon torpedoes.
WHEEL OF MISFORTUNE (181) Spin wheel and watch out!
PC-JIGSAW v1.1 (GAM71) Beautiful computer jigsaw puzzles. Color or mono.
EAT 'EM II (GAM 74) Like Pac Man but with a bigger field.
KID-GAMES (GAM8) Math, clock, alphabet, etc. (CGA)
KINGDOM OF KROZ (GAM5) Arcade, adventure, and strategy game with 25 levels.
CHESS (GAM9) Incredible. 2D and 3D. Playback moves, store games, etc. (CGA)



EGA RISK (GAM11) World domination in great color. With EGA Asteroids (EGA)
NETHACK (GAM20) Adventure game. Many dangerous levels, rooms, corridors.
PC-GAMMON (GAM33) Easy to learn, yet challenging.
BLACKJACK! v1.5 (GAM47) Professional. Superb graphics (Mono or EGA)
MORAFF'S REVENGE (GAM 66) Adventure with castles, dungeons, maps, monsters!
SCRABBLE (GAM72) Exact rendition of the all time favorite (EGA)
CRIBBAGE PARTNER (GAM 98) The complete board game!
CADDIEHACK EGA GOLF (GAM100) Best 18-hole shareware golf game around! CGA ver. is **GAM101** *(EGA)*
MAH JONGG (GAM103) High tech simulation. CGA and VGA version included.
SOLICARD (GAM106) Eight great solitaire card games.
PAS TRIVIA v3.02 (GAM114) Family oriented trivia game for up to 6 players.
CROSSWORD CREATOR (GAM 108) Shareware's finest crossword puzzle generator!
SHARP SHOOTER (GAM84) Tank vs. tank warfare game. Up to eight players (CGA)

PROGRAMMING

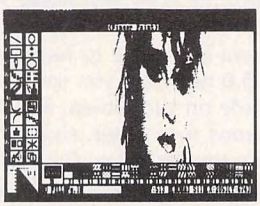
WINDOW PRO (1613, 1614/2 disks) Create windows and titles for menus, etc.
PC-BASIC PRIMER (1625) Learn BASIC in a very colorful way (CGA, BASIC).
PERSONAL C COMPILER v1.2 (1627) Learn the C language (2 FD or HD)
A86-D86 (1707, 1709/2 disks) World's best assembler, disassembler program.

WORD PROCESSING

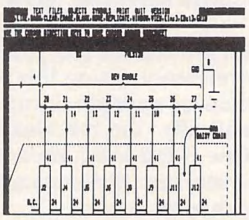
WORDS & EDITS (TXT2) Full-screen text editor for ASCII.
PC-WRITE v3.02 (434-436/3 disks) Very popular. With spell checker (2 FD or HD)
GALAXY v2.42 (407) Easy to use. Mouse, EGA support.
PC-WRITE MACROS v1.2 (458) 100 commands for PC-Write.

GRAPHICS

SIMCGA/HGCIBM (1027, 1062/2 disks) Use with Hercules graphics card/compatible to run CGA programs on your monochrome.
IMAGE-3D (1048) Create, edit 3-D objects. Move, scale, rotate image (CGA).
FINGER PAINT v2.00 (1050) Use keyboard or mouse to draw. Like MacPAINT (CGA)



DRAFT CHOICE (GRA6) Excellent menu-driven CAD program. Mouse support.
CHARTS UNLIMITED (GRA 16) Complete system for flow charts: organizational, electrical, etc., with symbols.



MIND CHART (GRA37-GRA 38/2 disks) Menu charting and drawing programs.

SPREADSHEETS

AS-EASY-AS (505) Has screen help menus. A Lotus clone that reads Lotus files.
PC-CALC+ v1.0 (512-514/3 disks) Jim Button's famous Lotus clone (2 FD or HD)
PIVOT v1.01 (516) Prints Lotus or As-Easy-As files sideways.

EDUCATION

GOOGOL MATH (EDU15) Math learning system. Many levels of difficulty. (CGA)
MATH CASTLE (EDU 18) Save castle from aliens by solving math riddles! Fun!
FUNNELS AND BUCKETS (201) A fun way to learn math. For ages 5 through 8.
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FACTS 50 (239) Geography lessons for U.S. (BASIC).
PC FASTYPE v3.01 (241) Touch typing instruction with WPM, accuracy, etc. (CGA)
AMY'S FIRST PRIMER (248) Game that teaches letters, numbers, keyboard (CGA)

AMY'S FIRST PRIMER

SPANISH I & II (211, 232/2 disks) Great tutorial (BASIC)

UTILITIES

SCREENSAVER v1.05 (UTL 21) Save monitor from burn-in. For all video displays.
DBS-KAT (UTL 30) Catalog your floppy disks (HD)
PAS MASTER MENU v1.02 (UTL33) Interface for multiple user passwords. (HD)
BRADFORD v2.0 (2729) Beautiful fonts for your dot matrix.
PROFESSIONAL MASTER-KEY v3.0 (2805) Like Norton's. Retrieve deleted files. A lifesaver (2 FD or HD)
TECHSTAFF TOOLS (3068-3069 /2 disks) 13 utilities no computer should be without!

DOS

TUTOR.COM v4.4 (1301) Interactive DOS tutorial.
STILL RIVER SHELL v2.58 (1304) Run DOS commands from menu. Makes DOS easy.
HELPDOS v2.0 (1326) On-line DOS help with menus. Includes DOS dictionary of terms and a hints menu.
HARD DISK MENU IV (1332) Organize HD for speed, ease of use. Password protection.

RELIGION

BIBLEMEN (3330) Excellent Bible quiz program.
BIBLEWORKS (3356-3361/6 disks) Bible with concordance, allows editing. Old and new testaments (2 FD or HD)

MUSIC

CHRISTMAS SONGS (311) Collection of your favorites.
COMPOSER (313) Create, edit and play music. (CGA)

ACCOUNTING/ FINANCE

MARKETCGA v2.2 (BUS17) Analysis on stocks, funds, etc. EGA ver. is **BUS 16** *(CGA)*
TICKLEX (BUS62) Appointment calendar with reminder, alarm, timetable, etc. (HD)
AMORTIZE (BUS113) Calculate, print loan amortization schedules.
FINANCE MANAGER II G/L v1.3 (751) Personal or small business (2 FD or HD)
MEDLIN ACCOUNTING (757) G/L, A/P, A/R and payroll.
EXPRESS CHECK v2.06 (786) Checking account with running balance, monthly reports, etc. Prints checks.

APPLICATIONS

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Word processors don't help you write. . .

They help you edit, but that's about it. Now, an editing assistant is a worthwhile thing to have, but somewhere along the line word processors must learn to process words from their inception.

What I'm saying is that word processors, when combined with their kindred outlining packages, are living in the past. Composition research is demonstrating that the distinction we used to draw between organizing information and drafting text is artificial. Writing is discovery, whether or not that writing is "creative."

Companies like IBM and Hewlett-Packard are working to separate the writing processes into a series of miniprocesses. Planning and outlining come first, editing and verification at the end. In the middle is this amorphous thing called drafting. But writers know that drafting doesn't work this way—you can't just take the ideas you thought of earlier and put them down on paper, or screen. Each idea expands and develops as the writing occurs, because the act of writing is highly complex. The processes must be considered as one large process, because writers are both designers and producers.

What we need is software that will help us explore the workings of our minds as we create text. To be sure, what we have now is significantly better than nothing, because a motivated and capable writer can mesh outliners and information managers with word processors and other software to create a writing environment far in advance of anything possible before. But no software exists that replicates the workings of our minds any better than a pencil and paper has done for many, many centuries.

I look at Keith Ferrell's argument, and I see a sophisticated and literate defense of what word processing, with all its offshoots, has become. But Keith is already a fine writer; he is able to adjust his writing processes to take advantage of the technology. I suggest, though, that only the most capable writers are able to do so, and that the software, like so much current software, merely preaches to the converted.

Word processors are nothing more than blank pieces of paper with some fancy editing capabilities. Interfaces remain primitive and poor (no pointing device is as efficient as moving your pencil to a place on a page), and screen sizes effectively eliminate the possibility of sustained coherence.

If word processing software is to advance to the point where it becomes universally useful, it must somehow abandon the concept of typing in your draft, word by word, paragraph by paragraph. In other words, it must learn to *process* words, not merely to line them up. Yes, Mr. Ferrell, writing is an internal process, but until word processing software renders that process easier—instead of simply more convenient—it will remain an enormous underachievement.

— Neil Randall

Neil Randall is a professor of literature and rhetoric at the University of Waterloo, Canada, where he also directs the Centre for Professional Writing. A regular contributor to the COMPUTE! family of magazines, he has published articles, reviews, and books.

Word processors do help you write. . .

More importantly, word processing software helps you prepare your writing to be read.

My colleague Neil Randall disagrees, but he's wearing blinders. Neil's focus is so tightly tuned to the *process* of writing that, like the centipede who tried to count his legs and succeeded only in stumbling over himself, he has lost sight of writing's goals. Looking at writing, Neil sees only its mechanical aspects.

Those aspects are undeniably important, and word processing software helps simplify them. Far from constraining communication, my own electronic writing tools—an outline/idea processor, a full-featured word processor, a laser printer—liberate me to focus more fully on communication itself.

In fact, my setup is flexible, fast, and tailored to my needs. On an 8088 computer, I can guide my cursor, via search routines, to any spot in a long manuscript far more rapidly than I could find that spot on paper. (This is not to decry paper—I've long recommended that at least one draft of any piece be edited on paper. For that matter, I also read my pieces aloud; how words sound can affect how they are read.)

Flexible? I travel from idea processor to word processor at will, shuffling and reshuffling ideas as I go. Doing so, I achieve, at least by my own lights, exactly the sort of ongoing creative synthesis that Neil suggests is difficult if not impossible with the computer. For me, outlining, drafting, editing, and revising become one constant process—*writing*.

Because I have the tools needed to revise and reorganize at will, I'm free to devote my attention to my words' meaning. The writer's most precious asset is time, and extra time may be the computer's greatest gift. Revision is a matter of concentrating on word choice and content, not on retyping. The hard work of writing remains, but the drudgery is gone.

Do word processors make writing easier? No, but neither did typewriters or pencils. Writing demands reflection, discipline, observation. Neil Randall, a good writer, should know that, finally, *no* tool extant or imagined can help you with those.

The act of writing—and it *is* an act, you *commit* a piece of writing, much as you would commit a crime—is an internal process made more convenient but not easier by external factors. We write with our heads and hearts, not our fingers.

But when the writing emerges in search of shaping, refining, editing, and distribution, I'm thankful my fingers are poised, ever so lightly, over a computer keyboard.

— Keith Ferrell

In addition to being features editor for COMPUTE! Publications, Keith Ferrell is the author of seven books, as well as numerous magazine and encyclopedia articles.

feature if you wish. Setting screen colors is now easier, and *Word*'s file-handling routines are more flexible. Inserting tabs is now a one-step process. Finally, *Word*'s excellent macro language has a couple of new commands. Microsoft even includes 40 powerful built-in macros.

With its new features, *Word* 5.0 can even fill in as a competent desktop publishing program. Old-time *Word* users will definitely benefit from an upgrade. Other users owe it to themselves to try this program. You won't be sorry.

— *George Campbell*

WordPerfect 5.0

Over the years, WordPerfect has built a reputation for quality that is the envy of many software publishers, and *WordPerfect* has a user loyalty that must be seen to be believed. Because of this loyalty, *WordPerfect* has become a standard in both the academic and the corporate worlds.

The original selling point of *WordPerfect*, and the feature that continues to impress its users, is its blank screen. Except for roughly 25 characters of information on the bottom right, which show document, page, line, and position numbers, *WordPerfect*'s display is entirely blank. In version 5.0, you can also display path information in the bottom left of the screen, but nothing else mars this perfect screen.

The result: *WordPerfect* comes as close as a program can to emulating a blank sheet of paper. Once past the meager title screen, your monitor becomes just another hunk of paper you've slid into your typewriter. No menus, no character marks, nothing. Just the words you type.

The innovations in *WordPerfect* 5.0 center around desktop publishing and changes in the user interface.

This blank screen means that *WordPerfect* relies on keystrokes to perform its wealth of features. In particular, the program uses function keys, with an overlay included in the package to show you what each function key means. Furthermore, each function key has four separate functions, depending on whether you use it with the Shift, Ctrl, or Alt key, or just by itself. Virtually everything is available here. Most function keys lead to a menu of choices, and these menus are particularly informative.

WordPerfect 5.0 is the most feature-laden *WordPerfect* yet. Like its predecessors, it has a good spelling checker and a brilliant thesaurus. Full block operations are available, and you can edit by bringing up the Reveal Codes subscreen (which shows all the hidden commands). F4 indents your next paragraph four spaces to the right, while Shift-F4 indents it four spaces both left and right. You can import and export ASCII files (albeit with few options), and you can print single pages, full documents, blocks, and so on. The program contains printer files for dozens and dozens of printers.

WordPerfect has always shone in three areas. First, its footnote and endnote systems are truly elaborate, with long footnotes and nested footnotes in a variety of easy-to-create numbering styles. Second, full macro capabilities let you automate whatever you need, because the program does nothing more than record and save the keystrokes you designate. Finally, creating multilevel indexes and full tables of contents, figures, and illustrations are possible in your documents. Doing so isn't exactly easy, but once you know how, you'll feel encouraged to experiment.

The innovations in version 5.0 center around desktop publishing capabilities and changes in the user interface. The interface is easier to use, even though it's essentially the same. As for desktop publishing, *WordPerfect* now lets you work with fonts and page design much more readily. Print Preview shows you what your document will look like when printed, letting you see the full page, a blown-up version of the current page, or a reduced version of two facing pages. Furthermore, the package now uses style sheets that let you build the recurring designs you want.

Why buy *WordPerfect?* Unless you need its advanced capabilities, there's no reason, especially since several lower-priced packages offer most of them anyway. But if you're a writer, knowing you're working with one of the best-supported and well-liked packages means something. And if you can buy the program through an educational institution, at prices as low as $125, the question becomes *Why not?*

— *Neil Randall*

WordStar 5.5

Once, *WordStar* ruled the microcomputer word processing roost. It outsold all of its competition combined, and its command structure set an industry standard that is still employed in some quarters—including other word processors (notably *PFS:Professional Write*, *Sprint*, and *Zedit*).

Then, as often happens, parent company MicroPro International chose to rest on its laurels while other, hungrier companies examined the needs of an increasingly sophisticated market. *WordStar* gradually lost both users and prestige.

The result was a foregone conclusion to everyone, seemingly, except MicroPro, who fought back not with adaptation, but with tacked-on peripherals. *WordStar* 4.0's Telmerge was probably the King of the White Elephants: a communications package that crawled along at a top speed of 1200 baud and couldn't touch the best available shareware programs.

In the last year, MicroPro has finally settled down to a hard game of catch-up. There has been a lot of it to do, since standard high-end features now include graphics importation and file conversion for data generated on other word processors.

Typically, *WordStar* has gone at matters in modular fashion, but its additions and changes represent significant improvements rather than window dressing. Most notably, MicroPro has added Inset Systems' *Inset* graphics program. This is a powerful, full-featured package that runs smoothly through *WordStar*'s ^P menu.

With *Inset*, you can capture and insert in your text any image viewable onscreen, whether developed through a graphics program or a spreadsheet. ▷

Advanced Page Preview then displays your document as it will appear when printed, including fonts, footnotes, and columns. As many as ten pages can be examined simultaneously for overall layout.

Star Exchange, though, may represent a more significant concession to user pressure. For the first time, MicroPro has included an externally run program module that converts files to and from other word processors. *WordStar*-generated data is now compatible with recent releases of *WordPerfect, Display Write 4, MultiMate Advantage,* and *Microsoft Word.*

Also prominent among release 5.5's new features are paragraph styles. *WordStar* users have complained for years about the inability to change default document-defining parameters like page width and line spacing. Now, you can preset and load files containing print attributes, fonts, margins, and so on. If all this presents a feeling of déjà vu, it's probably because this feature is a near-clone of similar offerings in *WordPerfect* and Quicksoft's *PC-Write.*

Other new features from *WordStar* include streamlined procedures for newspaper-style column creation and new, onscreen tutorials. Installation has been revised through WSSETUP to be simpler and less confusing. (*Anything* would have been less confusing than *WordStar* 5.0's overly technical twins, WSCHANGE and WSINSTALL.)

Although menus are available from the function keys, excellent typists will still probably prefer *WordStar*'s old command structure. This was patterned on the typewriter keyboard, adding only the Ctrl key to distinguish commands from regular data input. Thus, ^S moved back a letter, ^A back a word, and ^D forward a letter. ^Q (quick commands), ^O (onscreen format), ^P (printing), and ^K (cut and paste) each summoned a half-screen submenu of commands.

WordStar still clings tenaciously (perhaps unwisely) to its dot commands for formatting and printing. Some people find this an annoyance because it makes the screen image different from the final, printed text. Others (including myself) prefer an instant view of all operative document commands. Thus, we aren't caught unawares when a moved paragraph suddenly reformats itself into triple-spaced boldface.

	Microsoft Word 5.0	*WordPerfect* 5.0	*WordStar* 5.5	*XyWrite III Plus* 3.55
Publisher	Microsoft	WordPerfect	WordStar International	XyQuest
Price	$450	$495	$495	$445
System Requirements	384K (512K recommended), two double-sided drives or one double-sided drive and a hard disk	512K (640K recommended), two floppy disk drives (hard drive recommended)	512K (640 recommended), two floppy drives or one floppy disk drive and a hard disk	384K, one 720K floppy disk drive or a hard disk
Spelling Checker (number of words)	130,000	115,000	100,000	100,000
Thesaurus (number of words)	220,000	250,000	220,000	220,000
Command Interface	Menus with function-key shortcuts	Function keys	Control keys or pull-down menus	Command-driven or function-key shortcuts
File Import	ASCII, DCA, RTF, *Lotus 1-2-3*	ASCII, DCA, RTF, *1-2-3*, DIF, Navy DIF, *WordStar* 3.3 or earlier, *MultiMate* 3.22 or earlier, 7-bit transfer format	ASCII, DCA, RTF, *1-2-3*, DIF, *dBase, Microsoft Word*	ASCII
Mouse Support	●	○	○	○
Style Sheets	●	●	●	●
Columns	●	●	●	●
Page Preview	●	●	●	○
Graphics Import	●	●	●	●
DTP Features	●	●	○	○
Footnotes	●	●	●	●
Outliner	●	●	●	○
Redlining	●	●	●	●
Macros	●	●	●	●
Mail Merge	●	●	●	●
Math	●	●	●	●

With this 5.5 upgrade, *WordStar* may no longer be first in a field of no-contests, but it is definitely running strong against the powerful opposition. *WordStar* 5.5 is back, once again a high-end word processor to be reckoned with.

— *Barry Brenesal*

XyWrite III Plus 3.55

XyWrite is a high-end word processor with a reputation for two things: being blazingly fast and being difficult to learn.

I'll agree with the first assessment—the program is fast—but I don't think it deserves its hard-to-learn reputation. In fact, I'd argue that a beginner can be doing useful work with *XyWrite* sooner than with almost any other high-end word processor, except perhaps *Microsoft Word*.

Why does *XyWrite* have this bad rep for being hard to harness? Because it is *command-driven*, which means that instead of selecting options from a menu, as you do in *Word*, or pressing function-key combinations, the way you work in *WordPerfect*, you type commands at a command line.

XyWrite's keyboard-definition file includes every imaginable key combination, not just the common ones.

To save a file, for example, you type SAVE, or simply SA; to call a file (load it), you type CALL or CA. This isn't exactly rocket science, but typing commands is not everyone's cup of tea.

XyQuest must believe that users will like the speed and power of *XyWrite*'s command-driven interface once they get used to it, but to help them in the interim, the company has recently introduced *Á la Carte*, a menu-driven interface á la *Lotus 1-2-3* that's included with each *XyWrite* package. *Á la Carte* definitely makes *XyWrite* easier to learn, and after you've mastered the menus, you can graduate to speedier commands and function keys.

XyWrite's interface may be controversial, but few would argue that the rest of the program has exceptional speed, power, and flexibility.

The program's speed is legendary. Perhaps the best example is its dazzlingly fast search-and-replace command. The first time you try this function on a file with a large number of replacements, you may think the program has prematurely aborted when it has actually finished its job.

Another instance of *XyWrite*'s speed is the way its spelling checker and thesaurus work. These modules are not unusual, but their speed is. Press the spelling checker's hot key and its window snaps onto your screen. The same thing is true for the thesaurus. These are excellent tools, and you're more likely to use them if they're fast.

One noteworthy aspect of *XyWrite*'s power is its screen display. Two screen elements—the command line and the line directly below it (which can display either a ruler or a line)—are unchangeable, but you have unprecedented control over screen colors.

This color control is especially useful in *XyWrite* because the program has a huge number of modes. For every standard mode (bold, underline, and so on) there are redline modes for both deleted and inserted text. With an EGA or better system, each of these modes can have a different foreground and background color, so each is easy to distinguish.

The best example of *XyWrite*'s flexibility is its keyboard-definition file. With this file—which includes every imaginable key combination, not just the common ones—you can completely redefine the keyboard. But *XyWrite* doesn't stop there. If you wish, you can include macros directly in your keyboard file. So, if you want F12 to open a new window and display a directory, you just put the keystrokes in the file beside the key combination.

Complex macros can be created as separate programs and mapped to key combinations or executed

For more information about any product listed in this feature, contact the publishers at the address listed below.

Microsoft
16011 NE 36th Way
Redmond, WA 98073-9717

WordStar International
33 San Pablo Ave.
San Rafael, CA 94903

WordPerfect
288 W. Center St.
Orem, UT 84057

XyQuest
44 Manning Rd.
Billerica, MA 01821

Add-In Extravaganza

When you buy a high-end word processor, you get more than just the product. You get something intangible but very important: support. Among other things, support means that you can find books and software add-ins that in one way or another enhance the product. For the four word processors discussed in this feature, add-ins abound.

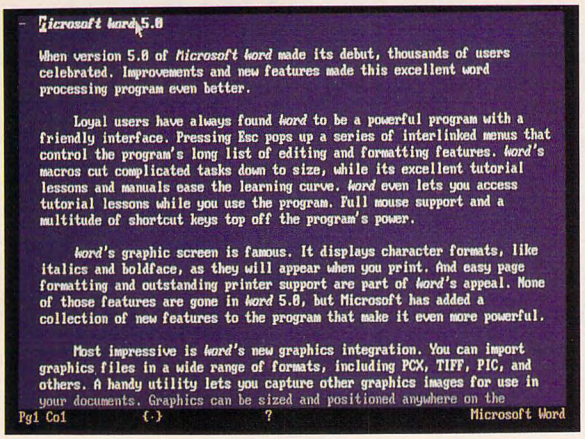
The *Microsoft Word Companion Disk* (Rinearson Support Associates, 219 First Avenue North, Suite 410, Seattle, Washington 98109; 206-726-9200; $49.95) is Peter Rinearson's replacement for Microsoft's online help. *Word*'s native help isn't shabby by any means, but Rinearson's add-in is outstanding. And, as a bonus, this package includes scores of useful, ready-to-run *Word* macros.

For word processors that don't offer mouse support, one of the most popular types of add-in is one that provides mouse input coupled with a generally improved interface.

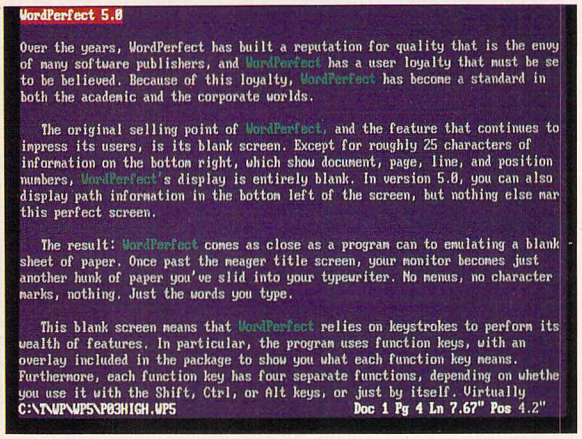
For *WordPerfect*, there are two excellent mouse-and-menu add-ins: *El Perfecto* (Mostly Mice, 125 Gates Avenue, Montclair, New Jersey 07042; 800-283-4080; $40; *StarMouse*, a *WordStar* 5.5 add-in, is also available for the same price) and *The Perfect Addition* (Applause Software, P.O. Box 4104, Salt Lake City, Utah 84110; 800-544-2049; $54.95). Both products enhance *WP*'s function-key interface with menus and highly functional mouse support. *El Perfecto* requires a mouse and comes with two sets of menus based on *WordPerfect*'s function-key template. *The Perfect Addition* is highly customizable and works well with or without a mouse. If you want to make *WordPerfect* a little friendlier, go for one of these.

XyWrite has two ways to add mouse support and menus. Herb Tyson's *EasyXy* (Mt. Vernon Electronics, 6028 Redwood Lane, Alexandria, Virginia 22310; $49.95) and *XyMouse* (Galactic Software, 136 Bridle Path Lane, P.O. Box 63, Feasterville, Pennsylvania 19047; $49.95) both make it possible to mouse around this faster-than-a-speeding-bullet word processor. If you want to give *XyWrite* a facelift, try one of these.

— *Clifton Karnes*


Microsoft Word 5.0
When version 5.0 of Microsoft Word made its debut, thousands of users celebrated. Improvements and new features made this excellent word processing program even better.
Loyal users have always found Word to be a powerful program with a friendly interface. Pressing Esc pops up a series of interlinked menus that control the program's long list of editing and formatting features. Word's macros cut complicated tasks down to size, while its excellent tutorial lessons and manuals ease the learning curve. Word even lets you access tutorial lessons while you use the program. Full mouse support and a multitude of shortcut keys top off the program's power.
Word's graphic screen is famous. It displays character formats, like italics and boldface, as they will appear when you print. And easy page formatting and outstanding printer support are part of Word's appeal. None of those features are gone in Word 5.0, but Microsoft has added a collection of new features to the program that make it even more powerful.
Most impressive is Word's new graphics integration. You can import graphics files in a wide range of formats, including PCX, TIFF, PIC, and others. A handy utility lets you capture other graphics images for use in your documents. Graphics can be sized and positioned anywhere on the
Pg1 Co1
Microsoft Word

Word's *graphic screen is famous. It displays character formats, like italics and boldface, as they will appear when you print.*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The result: WordPerfect comes as close as a program can to emulating a blank sheet of paper. Once past the meager title screen, your monitor becomes just another hunk of paper you've slid into your typewriter. No menus, no character marks, nothing. Just the words you type.
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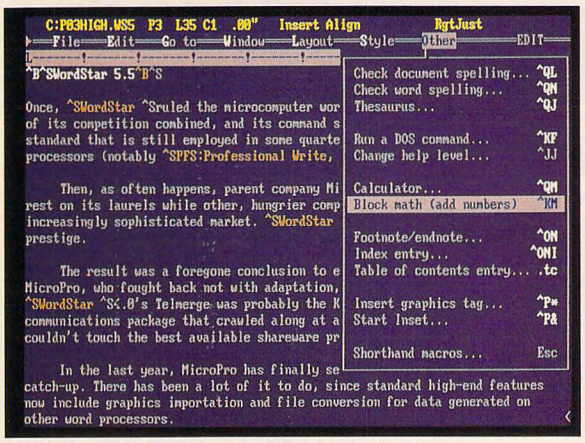
C:\NTWP\WP5\P03HIGH.WP5
Doc 1 Pg 4 Ln 7.67" Pos 4.2"

WordPerfect *comes as close as a program can to emulating a blank sheet of paper.*


C:P03HIGH.WS5 P3 L35 C1 .00" Insert Align RgtJust
File Edit Go to Window Layout Style Other EDIT
^B^SWordStar 5.5^B^S
Once, ^SWordStar ^Sruled the microcomputer wor
of its competition combined, and its command s
standard that is still employed in some quarte
processors (notably ^SPFS:Professional Write,
Then, as often happens, parent company Mi
rest on its laurels while other, hungrier comp
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prestige.
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MicroPro, who fought back not with adaptation,
^SWordStar ^S4.0's Telmerge was probably the K
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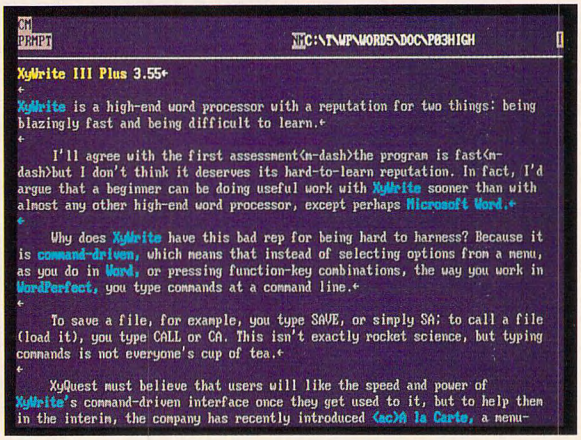
catch-up. There has been a lot of it to do, since standard high-end features
now include graphics importation and file conversion for data generated on
other word processors.
Check document spelling... ^QL
Check word spelling... ^QN
Thesaurus... ^QJ
Run a DOS command... ^KF
Change help level... ^JJ
Calculator... ^QM
Block math (add numbers) ^KM
Footnote/endnote... ^ON
Index entry... ^ONI
Table of contents entry... .tc
Insert graphics tag... ^P*
Start Inset... ^PA
Shorthand macros... Esc

Menus are available from WordStar's *function keys, but excellent typists will probably prefer the program's control-key command structure.*


PRMPT
C:\NTWP\WORD5\DOC\P03HIGH
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from *XyWrite*'s command line. You can do almost anything with *XyWrite* macros, and they are lightning-fast.

There's one drawback to *XyWrite*'s macros, however. The program has a record mode, but it doesn't operate live—you can't record a series of keystrokes as you execute them on text in realtime. Instead, you must record your keystrokes in a separate file and imagine the consequence of each.

Although *XyWrite*'s interface may not be to everyone's liking, the power of this word processor can be bewitching. Give it a try, and you may find yourself, to quote author Richard Bach, author of *Jonathan Livingston Seagull* and longtime *XyWrite* user, "seduced by the lightning system's glitter and fire."

— Clifton Karnes PC

High-End Word Processors by the Book

High-end word processors attract book authors. Almost every major publisher (QUE, McGraw-Hill, Sybex, COMPUTE!, Bantam, Addison-Wesley, to name just a few) offers a number of books on *WordPerfect* and *Microsoft Word*, and some have titles on *XyWrite* and *WordStar* 5.5. It's impossible to list every book available for the four word processors discussed in this feature, but here are three that are definitely worth considering.

Word Processing Power with Microsoft Word (Microsoft Press, 1989; $21.95) is *the* book on *Word*. Pulitzer Prize winner Peter Rinearson has been working with *Word* since its first release, and his expertise is evident everywhere in this officially endorsed title. If you can only buy one book on *Microsoft Word*, buy this one.

Word Perfect: The Complete Reference (Osborne/McGraw-Hill, 1988; $24.95), by Karen L. Acerson, is a one-volume, everything-you've-ever-wanted-to-know guide to this top-selling word processor. With entries from *Addition* to *Word Spacing*, this is the book to start your *WordPerfect* book collection with.

XyWrite III Plus (Addison-Wesley, 1989; $21.95), by Arthur R. G. Campbell, is a comprehensive guide to *XyWrite* commands with advice from someone who knows this word processor inside out. Campbell's discussion of *XyWrite*'s programming language is especially useful.

— Clifton Karnes

HOW TO UPGRADE TO A 386

Putting yourself behind the wheel of a 386 screamer may be easier (and less expensive) than you think. With this feature and *Upgrade*, a program on this issue's disk, you'll have all the facts you need to blast into the fast lane.

George Campbell

A desktop computer with the power of a mainframe? Ten years ago, this prediction seemed more like science fiction than science fact. But this prophecy has come true: Today you can buy an 80386 computer for *less* than you would have paid for the original IBM PC.

Exactly how much you'll have to spend depends on several things. First, there are actually two types of 80386 chips, and each type of chip comes in a variety of speeds—and prices. And there are several different upgrade platforms. When you mix these variables together, you have prices that range from less than $500 to more than $8,000. If you're confused, you're not alone.

It's also worth considering that you may not need to make the 80386 switch. While intoxicating speed is exciting, you need to ask some important questions before getting out your credit card.

The first thing to ask is the way you use your PC. Light-speed performance is wonderful, but you may not need it. If your main applications are word processing, games, and telecommunications, the fastest PC in the world won't speed up your keyboard, joystick, or modem.

But if you're always waiting impatiently while your computer grinds away with desktop publishing, CAD, or spreadsheet software, an upgrade can give you a big productivity boost.

Power users who want to use OS/2 or multitasking software like *DESQview 386* or *Windows/386* have no choice but to upgrade. Those programs demand an 80386 CPU. And business users running networking software also need the performance of the fastest machines.

If you use an 8088-based machine, this could be a good time for you to speed up your system with an upgrade. But as you'll see, you may want to upgrade to a less expensive AT clone rather than take the big jump.

Goodbye, Mr. Chips

An 80386 chip processes data in a 32-bit-wide path, rather than in the 8088's 8-bit path or in the 80286's 16-bit path, to give you the power of a desktop mainframe.

Computers based on the 80386 can also use more memory—up to 32MB in today's models. That means applications can grow beyond the old 640K limit. Multitasking is another new feature of the 80386. Both of these benefits, however, depend on software designed especially for the chip, and that's still in short supply.

Intel, which has produced all the CPUs used in IBM machines, also has created the 80386SX chip. Even though the 80386 uses a 16-bit external data path as does the 80286, it can run software written for the 80386. Many pundits say that the 80286 is obsolete, soon to be replaced by the 80386SX. Recent price cuts for the more powerful 80386, however, have made this less likely. It's interesting to note that Intel now calls the 80386 the 80386*DX* to distinguish it from its SX chip.

The new Intel 80486 chip is even more powerful than the 386. Most experts agree, however, that the 80486 machines will be used mostly as engineering workstations or in networks.

Varooooooom!

Speed is the big lure of an upgrade. As you shop for a new system, you'll see comparisons of the raw processing power of 80386 systems. Manufacturers use raw clock speed and software tests to entice consumers. Most advertisers use *The Norton Utilities* SI program, which measures speed against the original 4.77-MHz PC, which gets a rating of 1.

Systems using the 80386 come in four speeds: 16, 20, 25, and 33 MHz. You'll pay a premium price for the fastest machines. Systems running at 16 or 20 MHz currently have the most attractive prices.

To achieve a perceptible increase in speed, a new system should be twice as fast as your old one. A 10-MHz AT clone runs six times faster than a 10-MHz XT. A typical 16-MHz 80386 computer, however, is only 62-percent faster than a 10-MHz AT. You won't notice an enormous speed increase. To double the speed, you'd need a 20-MHz machine.

Some systems use features like RAM caching and zero wait states to further increase raw speed. These increases will show up in their speed ratings (see "A 386 Glossary" for more information about these terms).

Since upgrade costs vary widely, careful analysis is essential unless you have an unlimited budget. Business users can simply compare processor speed. If a given operation is twice as fast, its cost is half as much. For home users, personal factors play a more important role.

Thanks for the Memory

If you plan to use your new system with programs like *DESQview,* OS/2, or *Windows/386,* you'll need at least 2MB of memory, with 4MB recommended.

RAM chips come in three physical forms. DIP, SIP, and SIMM packaging are the most common. Each brand of motherboard can use one or more of these types. SIP and SIMM memory costs about 10-percent less per megabyte.

Memory speed is critical. One-hundred-nanosecond chips are fine for 16-MHz systems. CPU speeds of 20–25 MHz need 80-nanosecond chips, while 33-MHz systems demand more expensive 60-nanosecond memory. Memory prices are volatile, so watch the trends.

Until 80386 computers came along, compatibility wasn't much of a problem. Many 80386 buyers, though, have discovered that some of their favorite software won't run properly.

Games can run too fast, and drivers for disk caching and memory management can conflict with built-in disk- and memory-caching hardware, causing crashes and even data loss. Interestingly, 80386 systems without advanced features like disk caching, shadow RAM, and RAM caching are the most compatible.

Hardware conflicts are another problem. Some expansion cards can't handle the increased speed. You may have to replace memory cards, internal modems, bus mouse cards, and video cards or slow down your new system's bus speed.

Mothers and Daughters

Companies like Cumulus, AOX, and Sota offer 80386SX daughter cards that plug into your current 80286 socket. Starting at about $500, they let you run 80386-specific software, but there are some disadvantages. It's up to you to determine which of the three types of 80286 sockets you have before ordering. You're also stuck with the rest of your current computer hardware. A slow hard disk can cripple the system, and you can't use the faster 32-bit memory.

Add-in cards from Intel, Hauppauge, and others also offer an instant upgrade. Starting at about $700, they can upgrade either an XT or AT. These cards use an expansion slot and have a cable that plugs into the existing CPU socket. Most have room for 32-bit memory. Again, you're restricted by your current system. On an XT, there's no way to upgrade to a fast 16-bit hard disk controller or video card.

If adding a 386 card doesn't seem like the best solution to you, motherboard replacement may be an option. You can switch motherboards in an hour or two. New motherboards range in price from about $450 for a simple 80386SX motherboard to over $3,000 for a 33-MHz 80386 board with all the extras.

Naturally, you need a bit of technical skill to do the job. To upgrade an XT, you'll also need a bigger

Putting the 386 in Context

CPU	Address-Bus Width	Addressable Memory	Data-Bus Width	Speed Range
8088	20 bits	1MB	8 bits	8–16 MHz
8086	20 bits	1MB	16 bits	10–16 MHz
80286	24 bits	16MB	16 bits	10–20 MHz
80386SX	32 bits	4096MB	16 bits	16–20 MHz
80386	32 bits	4096MB	32 bits	16–33 MHz

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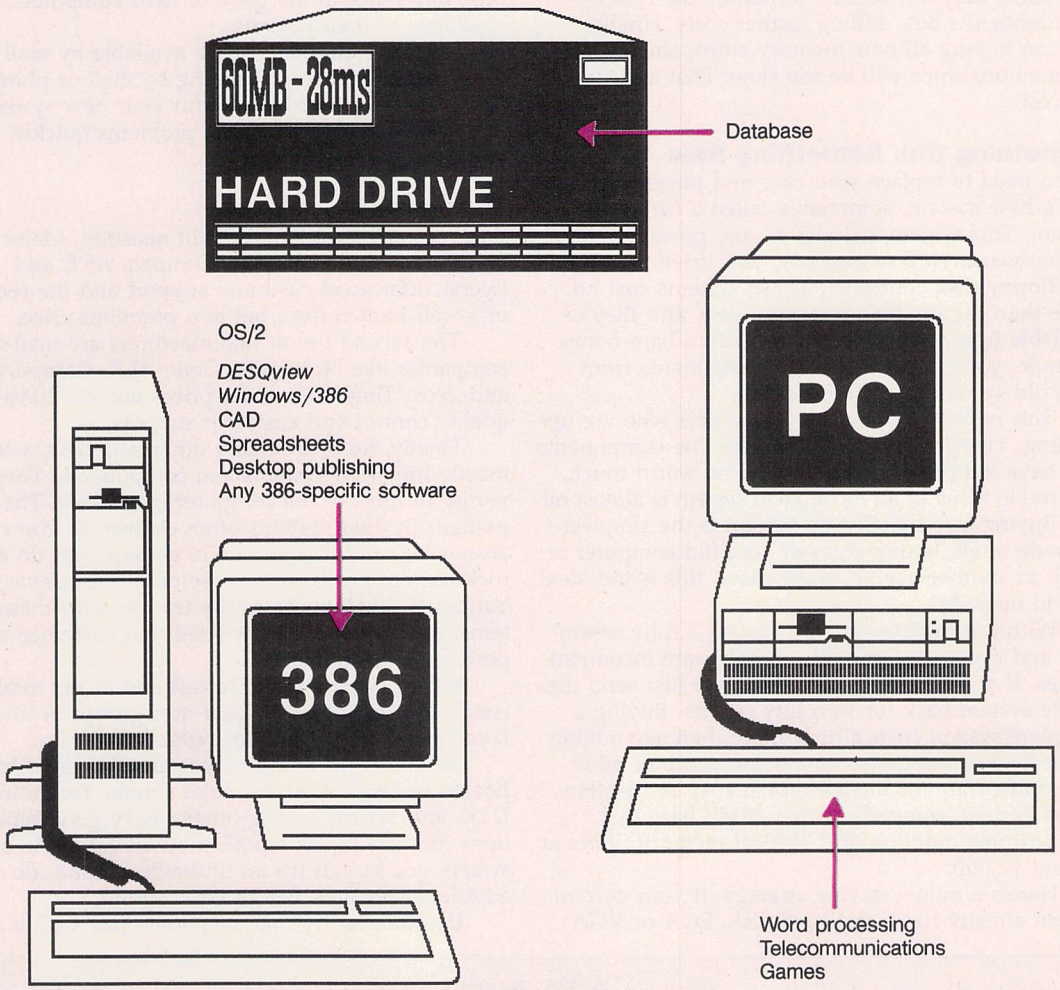
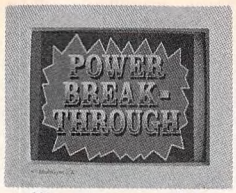
POWER BREAK-THROUGH

Do You Need a 386?



Ways to Upgrade to a 386

Platform	Pros	Cons
Accelerator cards	Easy to install and relatively inexpensive.	Because the rest of your system is unchanged, cards offer the smallest performance boost.
Motherboard	The most cost-effective way to upgrade to a 386.	Requires technical skill to install.
Bare-bones system	Allows you to swap high-end components from your current system.	You're left with a low-end, bare-bones computer you must sell.
Full system	The easiest way to upgrade and get the highest performace.	By far the most expensive upgrade option.
Other Upgrade Options		
Faster hard drive or controller	If your applications are disk-intensive, this option gives you a huge boost in performance.	The speed of processor-intensive applications stays the same.
Math coprocessor	A real boost for spreadsheet and CAD programs.	Disk- and many CPU-intensive programs run as slowly as before.



power supply and a new case to handle the taller 16-bit expansion cards.

Installing a new motherboard is a tempting option, but a slow hard disk can undercut your new processor's speed. Also, some of your current expansion cards may not be able to handle the faster motherboard's bus, adding further costs. Finally, plan on buying all new memory chips, since your old memory chips will be too slow. That adds to the cost.

Something Old, Something New

If you need to replace your case and power supply, buy a base system, sometimes called a *bare-bones* system. This system includes a case, power supply, motherboard, 1MB of memory, disk drive, and hard- and floppy-disk controller. These systems cost no more than the individual components, and they're available from mail-order firms. With a bare-bones upgrade, you simply move the components from your old system into the new case.

This method is ideal for XT owners who are upgrading. There's just one drawback: The components you have left over probably won't be worth much. The resale value of an incomplete system is almost nil.

Buying a complete new system is the simplest upgrade of all, letting you sell your old computer or put it to another use. In many cases, this is the ideal way to upgrade.

With a complete system, you get a fully assembled and tested system with no hardware incompatibilities. If you have any problems, you just send the whole system back for warranty repairs. Buying a complete system costs a little more than assembling the individual components, but the peace of mind can compensate for the additional cost. A 16-MHz 80386 system, complete with a 20MB hard disk, monochrome monitor, and 1MB of memory, starts at around $2,000.

Here's a money-saving strategy: If your current system already has a fast hard disk, EGA or VGA graphics, and other advanced features, buy the new system with monochrome graphics and a small hard disk. When it arrives, swap your high-end features into the new system. You can sell the old system, complete with the exchanged components. There's little difference in the price of used computers, *regardless* of their options.

All these alternatives are available by mail order or from local dealers. Ordering by mail or phone offers the lowest possible cost for your new system. Your local dealer can handle problems quickly, but you'll pay a little more.

Top Names

What to buy is a more difficult question. Major brand names such as IBM, Compaq, AST, and Everex offer good customer support and the security of a well-known firm, but at a premium price.

The second tier of manufacturers are mail-order companies like Northgate, Club, ALR, CompuAdd, and Zeos. They offer lower prices but still have good quality control and customer support.

Finally, there are many other suppliers, selling mostly imported systems and components. They advertise in most of the computer magazines. The components in their systems often change, so you can't always be sure of what you're getting. You do get rock-bottom prices from these outlets, however. You're not likely to have any trouble with these systems, but, if you do, be warned that customer support is often minimal.

Before buying at the lowest end of the market, check with members of local user groups or on your favorite bulletin boards for references.

Motherboard brand names are also important. Boards by Intel, AMI, Modular Circuit Technologies, DTK, and Mylex, among others, have good reputations. Be sure to ask whose motherboard is in any system you buy. If it's an unfamiliar brand, do some additional research before you commit.

If you order by mail or phone, pay with a credit

A 386 Glossary

As you shop, you'll encounter a new vocabulary. Here are some of the terms you may see, along with their definitions.

DIP (Dual In-line Package). DIP is one of the ways that RAM chips are packaged. This is the standard chip, with two rows of pins on each chip.

Disk caching. By using memory to store frequently accessed hard disk data, disk caching can cut down on the time needed to retrieve data.

DRAM (Dynamic Random Access Memory). This is the type of RAM most commonly found in MS-DOS computers. It requires regular refreshing by the CPU, a process that takes time.

Interleaved memory. This scheme lets the CPU process data stored in one section of memory, while another section receives data. Interleaved memory can be used with chips that are slower than would normally be needed.

MIPS (Millions of Instructions Per Second). This is a measurement of raw processing speed. The fastest 80386 machines run at a speed of about 4 MIPS.

RAM caching. This technique stores the most frequently used parts of RAM in ultrafast SRAM chips. Like disk caching, it offers an extra edge for supercharged performance.

Shadow RAM. By moving data stored in slow BIOS and video ROM chips to faster system memory, shadow RAM offers faster system operation and video performance.

SIMM (Single In-line Memory Modules). Another memory packaging system, SIMMs pack replaceable memory chips on a circuit board with a single row of contacts.

SIP (Single In-line Package). These are memory chips that are contained in one module. If one of the chips fails, you have to replace the entire package. SIMM and SIP packages save motherboard space, allowing more memory on the board.

SRAM (Static Random Access Memory). This RAM needs no refresh cycle. It's expensive, so it's used primarily for RAM caching.

32-bit memory. An 80386 CPU can access memory in a 32-bit-wide path, rather than in the 80286's 16-bit path, for faster memory access.

Wait states. Some memory chips can't keep up with ultrafast CPU speeds. To deal with this, many motherboards force memory access to slow down. Zero-wait-state operation is the ideal, but it requires faster (and more expensive) memory chips.

card, if possible. Your bank can help mediate conflicts. Don't be afraid to ask questions. Is the system in stock? What exactly will you get? What are the brand names of the components? Are there hidden costs, like a surcharge for credit-card orders? What about guarantees? The more questions you ask, the better.

Upgrade—Cost and Performance Analyzer

We've included a program on this issue's disk to help you assess the cost and performance of an 80386 upgrade. See "How to Use the Disk," elsewhere in this issue, for information on installing UPGRADE.EXE.

When you run *Upgrade*, you'll see a menu. Use the first menu selection to add information about your current system, including its estimated resale value. The program can save this data to disk and will read the data the next time you start the program.

The remaining menu choices ask you about the components you want in your 80386 dream system. Whenever you select an option, you'll see the advantages and disadvantages for that option.

Once you've made your choices, you'll see a report showing the cost for the individual components and the cost for a complete system with your specifications. You'll also see a speed comparison and the price difference between a complete new system and the value of your current machine.

You can change any element in your dream machine by selecting its menu entry. All other elements remain the same, allowing you to easily compare costs. By experimenting with different combinations of features, you can design the system that suits your needs and budget. All the costs reflect the lower prices of mail-order suppliers.

Non-386 Upgrade

There are other ways to speed up your system. By taking a close look at your current system, you may find that you don't need to take the 80386 route.

If you have a slow hard disk, with an access time of 65 milliseconds or more, upgrading to a faster hard disk can speed your work. A new hard disk controller with a 1:1 interleave factor is another speed-up option.

Some software, like CAD and spreadsheets, can make use of a math coprocessor chip. If you use these programs, you can get a dramatic speed-up by installing a math coprocessor. An 80287 chip for most AT machines costs about $250.

If you have a PC- or an XT-class machine, upgrading to a 386 could be overkill. A typical 12-MHz AT clone offers 6 to 12 times your current speed. If you don't plan to use 80386-specific software, the money you save could be used for additional features (such as VGA graphics) that you might not have been able to afford with a 386 computer.

Computer prices tend to drop with time. If you don't need a state-of-the-art computer right now, you can wait and upgrade for less money in the future. If you do decide to upgrade, your new 80386 system should take you well into the twenty-first century. PC

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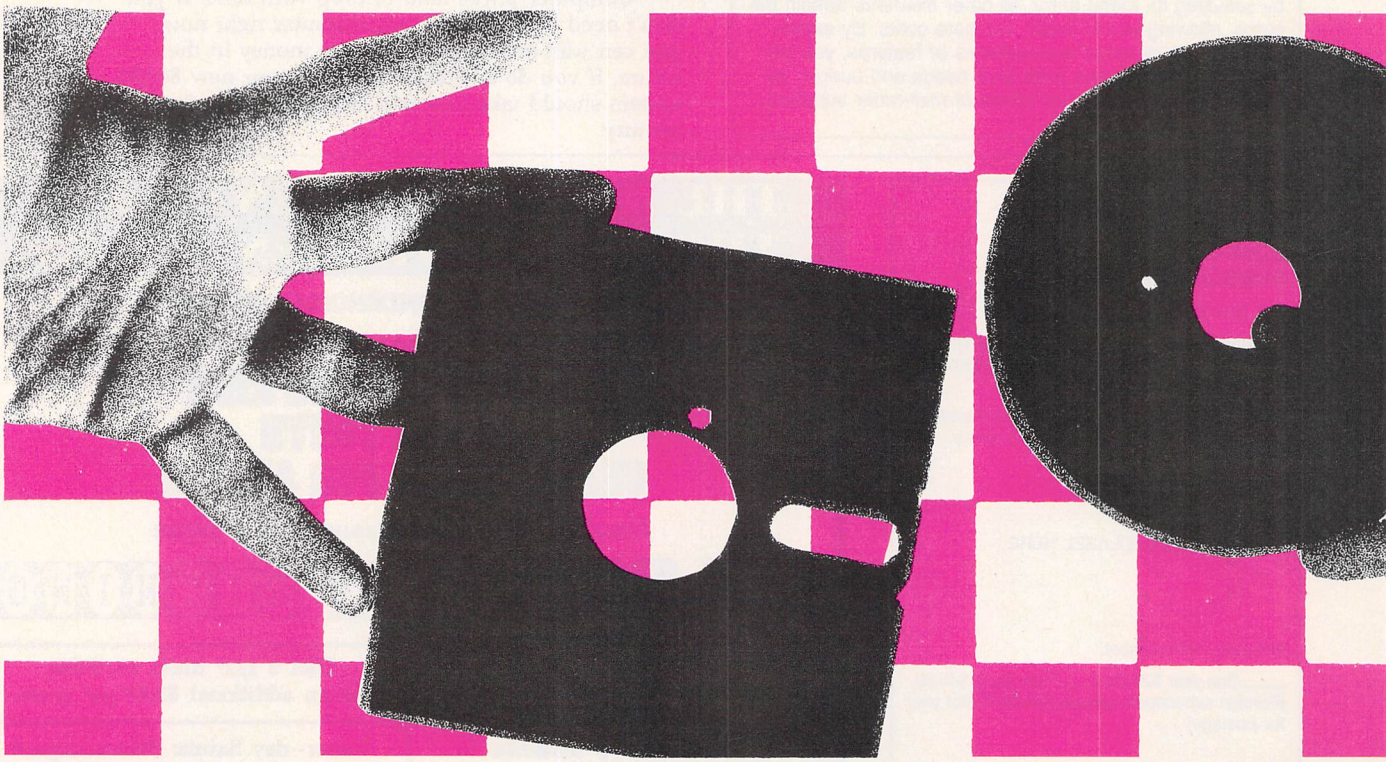
All About Floppy Disks

Kathleen Melymuka



Ever wonder how floppy disks
Read on — you're about to be
an instant expert.

How floppy disks work? Come

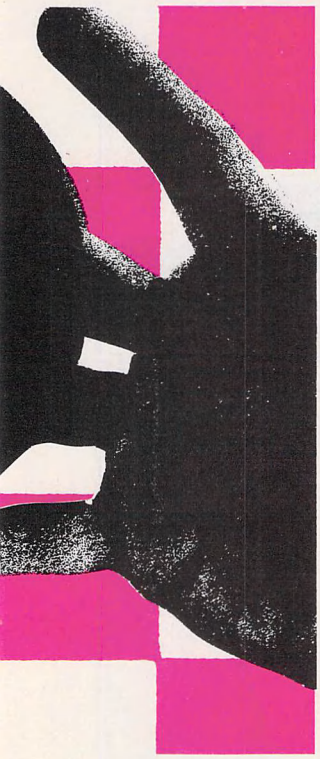
I have a friend whose culinary rule of thumb is *Never eat anything you can't identify.* I can sympathize. I get a little queasy working with technology I don't understand. But rather than forsake the meal or the technology, why not find out what it's made of?

For many, the PC is a sort of a technological mystery meat. But when broken down into its basic elements, it's as straightforward as hamburger. On the theory that a little knowledge is not such a dangerous thing, let's take a look at the mysterious little envelope whose rotations make the PC world go round: the floppy disk.

Floppies currently come in two popular sizes: 5¼- and 3½-inch. While the 5¼-inch size has been the standard floppy in use since the advent of the Apple computer, 3½-inch floppies, used in IBM's PS/2 line, are gaining in popularity. Even though the technology is similar in both formats, we'll zero in on the 5¼-inch format because it's the standard for most PC users today.

Anatomy Lesson

Inside the floppy disk is a round, flexible sheet of polyester film 75 microns (thousandths of a millimeter) thick. Applied to it is a coating of magnetic particles between 1 and 2.5 microns thick. The coating process is quite a feat. A 3M spokesman says it's like spreading a teaspoon of paint evenly over a 4 × 8 foot piece of plywood.



The disk is permanently enclosed in a square, flexible jacket made of polyvinyl chloride (PVC) and lined with .2 millimeter of fabric, which continuously cleans the disk surface as it rotates within the jacket. (The 3½-inch disk is encased in a rigid plastic jacket that's similarly lined.)

The jacket is full of holes. The large hole centers the disk in the PC's disk drive, like a record on a turntable. The small index hole next to the center hole helps the PC find data on the disk (more on that later). The long oval hole that runs from the outside edge of the jacket toward the center is the head-access slot. This is where the read/write head, analogous to the cartridge of a record player, comes in contact with the disk.

Two tiny notches beneath the head window relieve stress on the disk to keep it from bending during rotation. Finally, the write-enable/write-protect notch in the upper right side of the jacket permits or prohibits recording of data on the disk. By covering the notch with an adhesive tab, you protect the data on the disk from being overwritten. (The exact opposite is true with 3½-inch disks. They're protected when the notch is open.)

Write Stuff

The computer writes to the disk by transforming the 1s and 0s of binary code into electrical current, which flows across a gap in the write head, charging the magnetic particles on the disk beneath. To read the disk, the head passes over the charged magnetic particles, creating a current that the computer translates back into 1s and 0s.

1960: Al Shugart, one of the founders of Shugart Associates, proposes the floppy disk to IBM, only to have the idea turned down.

Late 1960s: IBM develops a dedicated floppy to load programs onto a hard disk.

Unlike old-fashioned computer tapes, disks store information nonsequentially. To get to the information at the end of a tape, you have to wind through all the data that comes before it. On a disk, you can find any piece of information as quickly as any other.

Because data on a disk is arranged nonsequentially, the location of each piece of data must be carefully indexed. This is done by means of track and sector addresses. When you format a disk, you assign these addresses and build a table of contents to match the data with its address.

The tracks on a disk are the lines the head follows when reading or writing information, much as a phonograph needle follows the groove on a record. But unlike the continuous spiral of a record groove, these tracks are concentric circles. The tracks are numbered starting with 0, the outermost ring.

The disk is also divided into wedges, starting with an imaginary slice through the index hole. The index hole defines the beginning of each track, and the subsequent wedges separate each track into information segments, or sectors. Each sector contains ID information and data.

Early 1970s: IBM uses single-sided, single-density 250K 8-inch disks for diagnostics. Commercial 8-inch disks soon become available for the word processing market.

1976: Apple introduces a single-sided, single-density 5¼-inch disk with 125K of storage for its Apple II personal computer.

1976: IBM announces its double-sided 5¼-inch disk, the 3601.

1978: IBM announces its double-density 5¼-inch disk, the Diskette II.

Finally, one track in each disk acts as a table of contents, storing the addresses of each piece of information.

Bringing such order to a blank disk takes up some of the disk space. A 500K disk, for example, will yield about 360K after formatting.

Standing Room Only

The storage capacity of a disk depends on several things. Single-sided disks work in single-headed drives; double-sided disks, which hold twice as much data, fit between the two heads in a double-headed drive.

A standard single-sided 5¼-inch floppy formatted with DOS 1.0 holds 160K (163,840 bytes) of information. Even though the disks are essentially

the same size, a double-sided 5¼-inch floppy holds 360K (368,640 bytes), and a high-density 5¼-inch disk holds 1.2MB (1,228,800 bytes).

1982: Sony develops a single-sided 3½-inch disk with 500K of unformatted storage. Sony first uses the disk with its own Series 35 word processor.

1983: Led by Hitachi, 17 American and Japanese companies agree to back the now-defunct 3-inch disk to compete with the 3½-inch disk. The companies include Maxell, Memorex, 3M, Fuji, T.D.K., and Epson.

1984: IBM introduces its AT model and high-density 5¼-inch floppy disk with 1.2MB of storage.

1987: IBM introduces its PS/2 line of computers and high-density 3½-inch disks with 1.44MB of storage.

1989: Zenith introduces its MinisPort laptop PC that uses 2-inch disks.

By the time 3½-inch disks were introduced to the PC, double-sided disks had become the standard. On the PC, double-sided 3½-inch disks hold 720K (737,280 bytes), and high-density 3½-inch disks hold 1.44MB (1,474,560 bytes).

In almost every case, you can successfully format a single-sided disk as a double-sided one. Keep in mind, however, that although the second side of the disk is almost certainly OK, the manufacturer hasn't tested it, so you're taking a small risk.

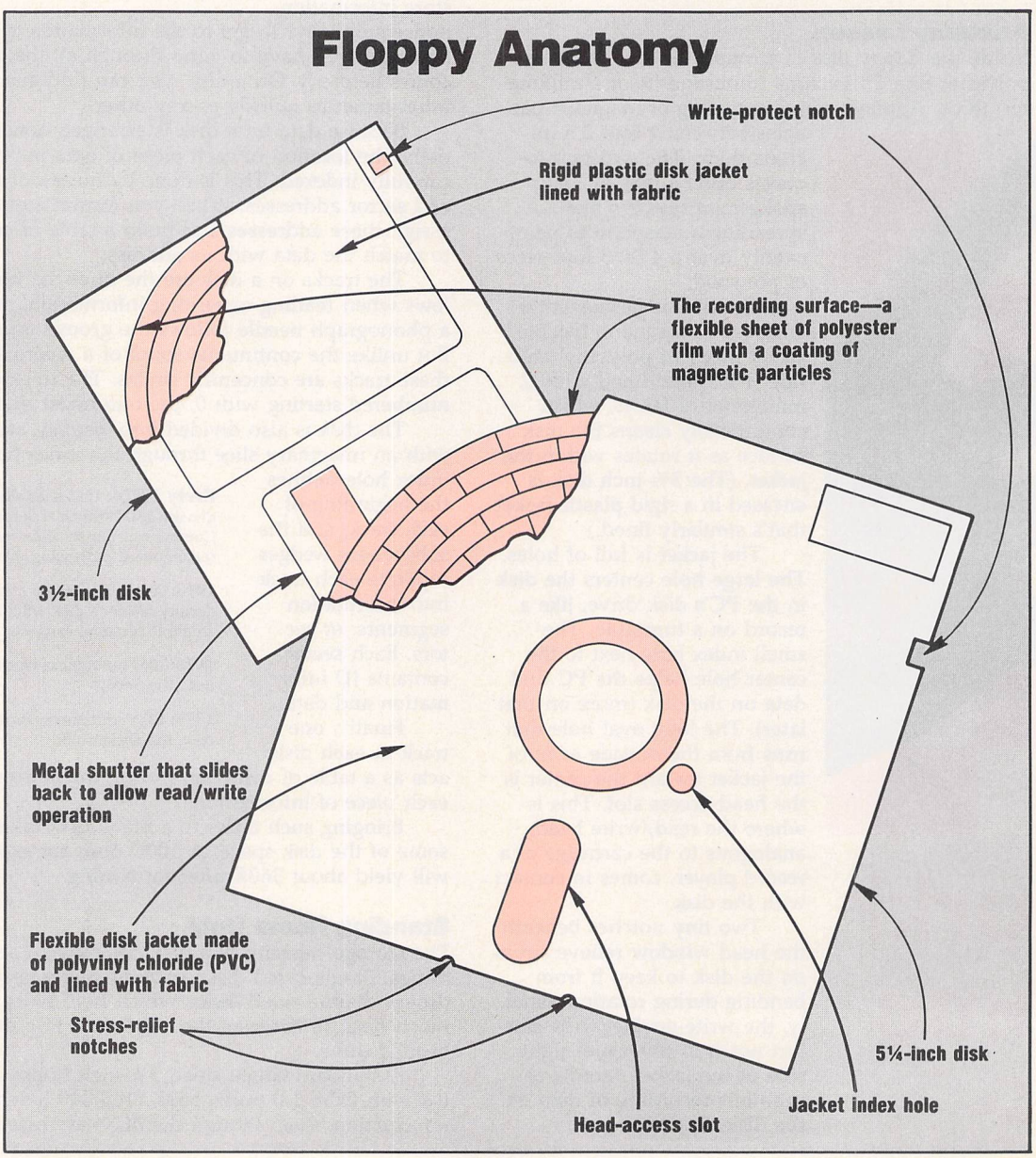
Out for Track

The next factor that determines the capacity of a floppy disk is the amount of information that can fit on each side. Two factors are important here: track density and bit density.

Standard 5¼-inch floppies have 40 or 80 (quad capacity) tracks per side, while the 3½-inch format can accommodate 135. (Track density is often expressed in tracks per inch, or TPI. A 40-track disk has 48 TPI, while an 80-track disk has 96 TPI.)

Bit density, measured in bits per inch, is the number of bits of data that can be stored in one inch of track. Bit density depends on the method used to record data.

In single-density recording, called *frequency modulation* or FM, each bit of data is separated from the others by clock bits, which do not carry infor-


Floppy Anatomy
Write-protect notch
Rigid plastic disk jacket lined with fabric
The recording surface—a flexible sheet of polyester film with a coating of magnetic particles
3½-inch disk
Metal shutter that slides back to allow read/write operation
Flexible disk jacket made of polyvinyl chloride (PVC) and lined with fabric
Stress-relief notches
5¼-inch disk
Jacket index hole
Head-access slot

Alice Topf

mation but space the data bits four microseconds apart.

Double-density mode, called *modified frequency modulation* or MFM, uses clock bits only to separate sequential cells with 0 bits. It records a bit every two microseconds, so much more data can be stored in a given space. Most disks today are at least double density. Newer high-density disks have even greater capacity.

These variables result in disks with unformatted capacities ranging from 125K to 2MB. To put this capacity in perspective, remember that a byte generally represents a single letter or numeral. An average typewritten page contains about 2500 data bytes as well as 500 bytes used for format and address information—for a total of 3000 bytes.

Speaking of capacity, 3½-inch disks offer the most capacity—as much as 2MB (since they're more rigid than 5¼-inch disk, they have greater track and bit densities). Other advantages of 3½-inch disks include increased protection from environmental and human hazards because of their hard plastic jackets. This may mean little to those of us with 5¼-inch floppy disk drives, but should the time come to refit your PC with a 3½-inch disk drive, it's good to know that the data recorded on your 5¼-inch floppies can be transferred intact to the 3½-inch format.

1990s: 3M and Maxell predict 5¼-inch floppies with 12MB and 3½-inch floppies with 20MB in the foreseeable future.

When it's time to shop for floppy disks, there's one rule of thumb. There's very little difference in quality among disks regardless of their price, so simply look for the best buys. And take one or two out for a spin. PC

Disk Don'ts

- Don't touch the magnetic surface of the disk.
- Don't bend, fold, stack, clip, or band disks.
- Don't place a disk in the sunlight or subject it to extreme changes in temperature or humidity. But if you must, allow at least a half-hour for the disk to adjust to the new environment before using it.
- Don't attempt to clean the surface.
- Don't put objects on top of a disk.
- Don't write on affixed labels. If you must mark an affixed label, use a felt-tip pen.
- Don't paste labels on top of each other.
- Don't put disks near magnetic fields, including magnets, tools or appliances containing magnets, and handbags with magnetic clasps. (Airport metal detectors and x-rays don't damage disks.)
- Don't use an eraser on or near a disk.
- Don't insert or remove a disk from the disk drive when the drive motor or the drive light is on.
- Don't eat, drink, or smoke near a disk. A tobacco-smoke particle takes up more space than a single bit of information on a double-density disk and can render a bit unreadable.

Fast Features: Floppy Disks*

5¼-Inch Disks

Number of Sides, Density	Tracks per Inch	Bits per Inch	Formatted Capacity
Single Sided, Double Density (SS/DD)	48	5,232	160K
Double Sided, Double Density (DS/DD)	48	5,232	360K
Double Sided, High Density (DS/HD)	96	9,275	1.2MB

3½-Inch Disks

Single Sided, Double Density (SS/DD)	Not used on the PC		
Double Sided, Double Density (DS/DD)	135	8,717	720K
Double Sided, High Density (DS/HD)	135	16,374	1.44MB

**Based on data from 3M.*

BUYER'S GUIDE

386 Motherboards

CAROLINE D. HANLON

With these state-of-the-art motherboards, you can transform your ordinary computer into a superfast 386.

Looking for a way to upgrade your PC without buying a whole new system? One option is to add a new motherboard—the heart of your computer. To give you an idea of what to look for, we've listed fifty 80386 motherboards, their specifications, and the address and telephone number of each manufacturer.

Before you buy, call or write the manufacturer for more information and to verify the price. You might also want to shop around. A local dealer may have the board you want, or a mail-order company may offer the same board for less.

How to Read the Chart

Boards come in two sizes: the larger, standard-size board that fits AT-compatible machines, and the smaller, baby-size board that is designed for PCs and XTs (but can also be used in an AT). If a board is populated, it includes RAM chips (many boards are sold without the RAM because the cost and availability of the chips varies from week to week). Speed refers to the processing speed of the CPU and is given in megahertz (MHz).

Motherboards include expansion slots for adding other cards (called *daughterboards*), and the slots are configured for 8-, 16-, or 32-bit cards. In our chart, the number in front of the slash is the number of available slots; the number after the slash designates the bit size. For example, 3/8 means the board has three 8-bit expansion slots.

BIOS (Basic Input/Output System) is the ROM-based software that controls communications between parts of the computer, such as the keyboard, disk drive, and monitor. Since some 80386 chips are faster than the system's memory, a small, high-speed cache of 32MB or more is sometimes installed to reduce memory access times.

A base system varies according to the company selling it, but it usually includes a motherboard, power supply, case, and floppy disk drive. Most companies provide technical support during business hours, and all of the boards we've listed have a warranty for parts, labor, or both. Prices are for unpopulated boards unless otherwise stated.

Company	Board	Speed (MHz)	Baby Size	Standard Size	BIOS	No. of Slots	Slot Configuration	Cache Available	Populated	Base System Available	Warranty	Prices		Comments
AOX	Z-Master 386	16, 20, 25, or 33	o	●	Phoenix ROM BIOS PLUS	8	2/8, 6/16	32K	o	o	1 year	$1,495 (16 MHz)	$1,750 (20 MHz)	Other prices: $2,195 (25 MHz), $2,495 (33 MHz); designed specifically for Zenith Z248; supports *Windows* 386, OS/2, UNIX, and others; allows up to 8MB of RAM
ATronics International	386SX	16	●	o	AMI	8	6/16, 2/8	o	●	1MB	1 year	$695 (1MB)	$1,520 (base system)	Supports up to 4MB onboard memory and 80387SX math coprocessor; technical support available

ATronics International	386/B-20	20	●	○	AMI	9	1/32, 6/16, 2/8	32K	●	1MB	1 year	$1,395 (1MB)	$2,220 (base system)	Supports 80287, 80387, and Weitek 3167 math coprocessors and up to 8MB of RAM; also available with cache card; technical support available
ATronics International	386/B-25	25	●	○	AMI	9	1/32, 6/16, 2/8	32K	●	1MB	1 year	$1,795 (1MB)	$2,620 (base system)	Supports 80287, 80387, and Weitek 3167 math coprocessors and up to 8MB of RAM; available without cache card; technical support available
ATronics International	386/B-33	33	●	○	AMI	8	1/32, 6/16, 2/8	32K	●	1MB	1 year	$2,395 (1MB)	$3,220 (base system)	Supports 80287, 80387, and Weitek 3167 math coprocessors and up to 8MB of RAM; available without cache card; technical support available
Cache Computers	Baby 386-20	16 or 20	●	○	AMI, Award, Phoenix	8	5/16, 2/8, 1/32	○	●	1MB	1 year	$625	$795 (1MB)	Available with 1MB, 2MB, 4MB, or 8MB of RAM; unlimited telephone technical support
Cache Computers	Cache 386-33	25 or 33	○	●	AMI, Award, Phoenix	8	6/16, 2/8	32K, 64K, or 128K	●	1MB	1 year	$1,295 (1MB)		User-selectable direct, 2-way, or 4-way cache algorithm; supports up to 16MB of RAM; unlimited telephone technical support
Cache Computers	Cache 386-33 EISA	25 or 33	○	●	AMI, Award, Phoenix	8	6/EISA, 2/16	32K	●	1MB	1 year	$1,595 (1MB)		Accepts 8- or 16-bit AT expansion cards and 32-bit high-performance EISA cards; supports up to 16MB of RAM; unlimited telephone technical support
Cache Computers	Cache 486-33 EISA	25 or 33	○	●	AMI, Award, Phoenix	8	6/EISA; 2/8	See comments	●	1MB	1 year	$2,995 (1MB)		8K internal cache available plus 64K or 128K external cache; supports up to 16MB; unlimited telephone technical support
Chartered Electronics Inc. (CEI)	SINGA 386SX	16	●	○	AMI	8	2/8, 6/16	○	●	1MB	1 year	$1,095 (1MB)	$1,495 (base system)	Includes case, 200-watt power supply, hard and floppy drive controller, 2 serial ports and 1 parallel port; technical support available
Chartered Electronics Inc. (CEI)	SINGA 386/20	20	●	○	AMI	7	2/8, 4/16, 1/32	○	●	1MB	1 year	$1,295 (1MB)	$1,695 (base system)	Includes case, 200-watt power supply, hard and floppy drive controller, 2 serial ports and 1 parallel port; technical support available
Chartered Electronics Inc. (CEI)	SINGA 386/25	25	○	●	AMI	8	2/8, 5/16, 1/32	○	●	4MB	1 year	$2,395 (4MB)	$2,795 (base system)	Includes case, 200-watt power supply, 1:1 hard and floppy drive controller, 2 serial ports and 1 parallel port; technical support available

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FRIDAY 1.03	BU 163	The "Executive Information System." Friday keeps track of important meetings, phone numbers, key contacts, etc. (HD req'd)
FREIGHT+	BU 166	(2 disks) If you ship more than 10 packages a day, you need this one.
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STOCK	BU 195	Dedicated inventory control program! Ideal if your business has a standard inventory list.
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LOTUS MACROS	SP 104	Save tedious work with these short-cuts for use with 1-2-3.
LOTUS TEMPLATES	SP 106	If you use Lotus, you'll love these ready-made applications!
INSTACALC	SP 107	This one's special - a fully-powered spreadsheet MEMORY RESIDENT (TSR)!
PIVOT!	SP 108	Sideways print routine for SP 103
QUBECALC	SP 109	This powerful 3-dimensional spreadsheet lets you view data in a new light.
123 POWER WORKSHEETS	SP 110	(2 disks) Powerful worksheets - these 2 disks are worth having if you use Lotus!
MIPSCALC PLUS	SP 111	(3 disks) Spreadsheet - reads, writes Lotus files - needs GEM
WHITLING WORKSHEETS	SP 112	(2 disks) Excellent budgeting tools for Lotus 123
LOTUS LEARNING SYSTEM	SP 115	(2 disks) A good, basic tutorial for anyone trying to learn how to use Lotus 1-2-3.
BEGINNING 1-2-3 TUTORIAL	SP 116	Worksheets and tutorial to take the novice 1-2-3'er through the basics.
ADVANCED 1-2-3 TUTORIAL	SP 117	Designed for someone who has worked through the basics.

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EZX-WRITE 2.3	WO 110	A first, highly functional word processor. Includes pull-down menus
THESAUR V3.5	WO 111	Shareware's 1st thesaurus! - very useful for a variety of applications
WORDPERFECT 5.0 TOOLKIT	WO 114	ASCII to WP5 format converter plus lots of other useful utilities
PRO-SCRIBE	WO 115	Improve the impact af your writing with this new program
WRITER'S HEAVEN 4.0	WO 116	For PC-Write versions 2.6 and up. A complete new set of command keys.
PC-WRITE MACROS 1.2	WO 117	100 macros for this popular word processor -Requires PC-Write 3.0 or later
WORDPERFECT 5.0 POPUP	WO 118	This handy tool pops all the information on function keys up on the screen!
WORDPERFECT MENUS	WO 120	Pull-down menus for both 4.2 and 5.0
WORD PROCESSING FOR KIDS	WO 122	A WP program with all the basic features designed just for kids!
NEWSLETTER KIT 1.01	WO 123	If you use Ventura Publisher 2.0, this one belongs in your program library!
PC-INDEX 1.1	WO 124	Save hours of work! Import a text file, and PC-Index will create an index!
IMAGEPRINT	WO 125	Great letter quality from that old Epson! Comes with good fonts!
New	**New**	**New**
WORDS & EDITS	WO 127	Text editor that's FAST and EASY! ASCII text output makes this one ideal for preparing program source code.
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NEWBASE II 4A	DA 104	Excellent user-supported DBMS with full menu package.
WAMPUM 3.3S	DA 105	Latest version of this legendary dBase III/IV compatible clone.
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WYNDFIELDS 1.0	DA 110	Here's a great database that's 3 disks squeezed onto one
JAGER MANAGER 1.4A	DA 111	Information manager with database, dialling and calendar
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FLAGS	ED 110	115 in all, displayed on screen for recognition and learning
PHYSICS	ED 111	High school level - excellent
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ALGEBRA	ED 113	Both integer and real computations - 1st class!
TEEN ED 1	ED 124	A kid's tutor for capitals, states and presidents
HIGH SCHOOL VOCABULARY	ED 126	Multiple-choice quizzes with re-testing and clear definitions.
WISDOM OF THE AGES	ED 128	(4 disks) Worldwide classical data - quotes, thoughts, proverbs
FRENCH I	ED 130	French for beginners - great!
FRENCH II	ED 131	Continues where French I leaves off.
GERMAN I	ED 132	An introduction to German
VIDEO CHEMISTRY	ED 138	Program for assisting in chemistry - valency and molecular combinations
FACTS	ED 140	A kid's tutor for capitals, states and presidents
THE PRESIDENTS	ED 142	(2 disks) Biographical and quiz system on all the US Presidents
MICRO WORLD DATA BANK	ED 143	(5 disks) Detailed world mapping database produced by the CIA
NIMONIK 1.1	ED 145	Helps you memorize many different subjects/languages
EDICOM-12	ED 146	A DOS assistance program /tutor for new PC users
WORDSTALK	ED 148	(2 disks) A really entertaining word game for all ages, with ability to solve crosswords and cryptograms etc.
GOOGOL MATH GAMES	ED 149	Math primer for pre-school and primary school. Classic arcade games.
PC BASIC PRIMER	ED 150	New! Menu-driven Basic tutor for beginners.
WORLD ATLAS	ED 151	(2 disks) Geographical information from the Rand McNally Atlas!
SAN MATEO SOFTSWAP	ED 153	18 educational games from the San Mateo Office of Education.
DOS NOVICE UTILITIES	ED 156	Ideal for starters!
BRANDON'S LUNCHBOX	ED 157	A collection of educational programs for pre-schoolers .
DOS LEARNING SYSTEM	ED 159	An excellent tutor for DOS, recommended for newcomers to DOS.
GRFX2	ED 162	Graph mathematical functions of the form "Y=F(x)".
JORJ	ED 165	(2 disks) A PHONETIC Dictionary!
New	**New**	**New**
PC-ORIGAMI	ED 166	Master the ancient Japanese art of paper folding. (Basic req'd)
SCHOOL-MOM	ED 167	A back-to-basics educational tool for children ages 4-14. Includes modules for music, art, spelling, English and math. (CGA req'd)
JEM-LOGO	ED 168	Programming for kids! JEM is a logo-like language designed to teach children how to program a computer.
LADYBUG GRAPHICS	ED 169	Another logo programming language for kids!
U.S. POPULATION DATABASE	ED 170	U.S. Census Bureau data on population from 1790 to the present!
CHEMVIEW	ED 171	A remarkable animated programs that will display a 3-D view of selected molecules. You can use CHEMICAL (ED 172) to construct your own. (EGA req'd)
CHEMICAL	ED 172	Select atoms from the periodic table, and create molecules using bonding input from the menu provided. Models can be viewed in animated 3-D with CHEMVIEW (ED-171) (CGA req'd)

PROGRAMMING/SECURITY & HACKING
Tutorials, Assemblers, Generators...

'C' TUTOR	PR 101	(2 disks) Complete 'C' tutor with examples ready to compile
PC PROFESSOR	PR 104	Good BASIC tutor
TURBO PASCAL TUTOR	PR 107	Learn how to use this great development package - recommended
'C' COMPILER	PR 108	(2 disks) Comp. programming environment - source, compiler, samples etc.
GRASP	PR 109	(2 disks) A simple graphics programming pseudo-language
ADA TUTOR	PR 110	Interactive ADA tutor requiring HD or 3.5" floppy - professional quality
HDBCALC	PR 111	A very neat hex/decimal/binary calculator - a must for serious programmers
PERSONAL APT 1.2	PR 113	Numerical control prog. language for engineering, design and drafting
COLORSET	PR 114	Pop-up color code reference for Clipper and dBase III programmers
UNPROTECT I	SH 102	Make personal copies of protected software
UNPROTECT II	SH 103	(2 disks) More ways to copy
UNPROTECT III	SH 104	Unprotect Softguard protection
UNPROTECT IV	SH 105	More programs that you can unprotect!
VIRUS KILLER	SH 106	Latest protection routines; Bombsquad, Chk4bomb, Dprotect, Flu Shot, NoHard, NoVirus and Vaccine - a must!
VSDP	SH 108	A handy program that checks for virus symptoms.

MUSIC
Compose, Save, Play...

PIANOMAN 3.2	MU 101	Turn your computer keyboard into a piano keyboard - lots of fun!
PC-MUSICIAN	MU 102	Compose, save and play your own music - inspirational and educational
MUSIC LIBRARY SYSTEM	MU 105	A really nifty music database for cataloging all your CDs, tapes and records
GREETINGWARE	MU 106	Play Christmas songs as you sing along. Customize a message and send a greeting on disk to a computer user friend. Entertaining seasonal fun!
MUSIC LIBRARY SYSTEM	MU 107	Easy composition for budding composers!
PC PLAYER	MU 108	Just pick a slection and let your CPU "player piano" pound it out for you.

GAMES
Chess, Planes, Adventures...

JET FLIGHT SIMULATOR	GA 101	Stimulating and fast-paced fun!
3-D CHESS	GA 103	Fantastic 2D and 3D play with many levels
GAMBLER'S DISK	GA 121	All the casino thrills - blackjack, slots, baccarat, solitaire
MONOPOLY WITH GRAPHICS	GA 127	An old favorite cleverly programmed for absorbing fun!
PC-PRO GOLF	GA 139	(2 disks) A must for the golfing fraternity - good graphics
EGA TREK	GA 140	Superb Star Trek game for EGA - fight Klingons and Romulans
MAZE	GA 142	Wolfgang Stiller's mind boggler - a LENGTHY mental challenge!
EGA SORRY!	GA 150	Immensely popular version 2.0 of this classic game, for EGA card only
GAMESCAPE	GA 152	The incredible adventure game designing system!
PINBALL ART GAMES	GA 156	Good pinball action - circus, money maze, par 3 golf, spooky , etc.
LOVE FIRE	GA 157	You fashion the structure of this love adventure as you go!
CAPTAIN COMIC	GA 158	A Nintendo 'Mario Bros' style game with multi-levels of play (EGA req'd))
BARD'S TALE CHAR-ED	GA 159	Allows modification of characters from Bard's Tale I and II
ED'S CHESS	GA 160	A truly fine chess game with the power to beat Chessmaster 2000!
CYRUS EGA CHESS	GA 161	A challenging opponent for chess if you have an EGA.
ARMCHAIR QUARTERBACK	GA 162	Set the scene and call plays in this football strategy game
MASTER THE MARKET	GA 164	Realistic and challenging stock market simulation
DRACULA IN LONDON	GA 166	A really good graphics and adventure game
EGA GOLF	GA 167	Play 18 holes with scenery in finer detail on your EGA!
PC-RAILROAD	GA 168	Control your trains on supplied routes or design your own
NINJA	GA 169	A commercial quality arcade game with karate tactics!
CRIME LAB	GA 170	A super, graphic, murder mystery game for all the family
MORAFF'S EGA/VGA PINBALL	GA 172	Here's a high class pinball for high resolution!
SUPER PRO WORD SEARCH	GA 173	If you like "word search" games in the newspaper, you'll love Super Pro!
PATIENCE	GA 174	Super Solitaire! Nine great card games,.
TUNE TRIVIA	GA 177	"Name That Tune" Includes a library of 200 tunes.
MILLE BORNES	GA 178	Now you can play this great card game against the computer.
YACHT RACING SIMULATOR	GA 180	Serious sailor, or landlubber, this one's challenging and fun! (CGA req'd)
DULLES TOWER	GA 181	Ever wonder what it's like to be an Air Traffic Controller?
RISK	GA 183	The classic game of world domination. (CGA req'd)
MOSAIX	GA 185	(2 disks) A remarkable electronic jigsaw puzzle generator .
BASS TOUR	GA 186	The latest version of a great fishing simulator! (EGA req'd)
TOMMY'S GIN RUMMY	GA 187	One of the best card games we've seen! (CGA req'd)
SCRABBLE	GA 188	THE program for Scrabble buffs! (EGA req'd)
BATTLE GROUND	GA 189	Control artillery, troops, etc. to destroy opponents. (CGA req'd)
FACING THE EMPIRE	GA 190	Defend the world of Lyra against the evil Morte Star Empire.
MAHJONG	GA 193	Fascinating, colorful oriental game for CGA.
PC CRYPTOGRAMS	GA 196	Cryptograms on disk.
DOMINATE	GA 197	Computer wargame for one to ten players.
VEGAS J'S DRAW POKER	GA 198	One of the best poker games/trainers available.
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BLACKJACK!	GA 199	Accurate simulation Blackjack game/tutor. (EGA req'd)
MINIATURE GOLF	GA 202	Tthe challenge of miniature golf on your computer. (CGA req'd)
CONDO	GA 203	Monopoly for the '80s! (CGA req'd)
TRIVIA CARD FILE	GA 204	Database of 3,000 trivia questions!
FIJE	GA 205	Graphic maze adventure. (CGA req'd)
BUDGET BASEBALL	GA 207	Manage your favorite major league team! (CGA req'd)
TETRIS	GA 211	The Russian arcade game that's sweeping the country!

GENERAL APPLICATIONS
Astronomy, Finance, Travel...

MAIL MASTER	GE 101	Good and dedicated mailing list manager for form letters and labels
CITY DESK	GE 103	Desktop publishing - simple but effective for smaller applications
GENEALOGY ON DISPLAY	GE 105	(2 disks) A complete package, ideal for beginners
PERSONAL FINANCE MANAGER	GE 107	Household budgeting, savings, investments, checking etc.
STRESS & SHRINK	GE 122	Stress test and personality analysis
PC-LOTTO 2.41	GE 152	Popular and all-embracing package for use with worldwide lotto games
GOLF MANAGEMENT	GE 154	Golf handicapping and league secretary programs.
XACT SERIES CALCULATORS	GE 155	Hewlett Packard calculators - faithful simulations of HP-11C Scientific, HP-12C Financial, and awesome HP-16C Programmers' model.
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LOTTO-CAL 1.01	GE 158	(2 disks) A powerful and scientifically oriented lotto predictor;.
FAMILY TREE 6.2	GE 161	Succesful genealogical package, with full documentation.
LOTTO 3.0A	GE 162	One of the best lotto programs - with every conceivable lotto feature
COUCH COACH	GE 166	Fantasy football drafter from Potato League Sports
PRO FOOTBALL LINEMAKER	GE 167	Calculates and projects point spread and expected statistics
HOME INVENTORY KEEPER 2.0	GE 169	Keep a record of the location and value of your household possessions.
VAR GRADE	GE 170	(2 Disks) Record, process and print grade reports.
THE TENANT FILE 1.3.2	GE 171	Keeps detailed tenant information, including payment histories.
THE CARDSHOP	GE 173	Baseball card collecting is profitable! Keep track of your investment.
EXAM BANK	GE 177	Stores exam questions (multiple choice, true/false, essay, etc.)
MINI COUPCAT	GE 178	Stores coupon information by category, brand, volume, expiration, etc.
PC-QUIZZER	GE 182	Create lessons and administer complete tests on a computer!
WEATHER FORCASTER 2.0	GE 183	Generate your own weather forecasts and calculate current conditions.
HANDWRITING ANALYST	GE 186	The science/art of handwriting analysis!
PC-AREACODE	GE 187	Find the area code for virtually any city in less than two seconds!
EXCHEQUER	GE 188	Check-writing and checkbook management with advanced features!
HOME MANAGEMENT II	GE 189	One of the best personal financial management programs we've seen!
RESUME!	GE 190	Your resume can be as professional as you purport to be!
BOWLING LEAGUE SECRTY	GE 191	Handy organizer for league information
QUICK CHECK BOOK	GE 192	(2 disks) One of the most advanced home checkbook utilities available!
DREAM HOUSE	GE 193	Plan you "dream house" with this user-friendly application.
ADDRESS PARTNER	GE 196	Powerful yet easy to use name/address data base.
KINFOLKS	GE 198	Create a detailed family history.
SURVEY	GE 199	Learn to survey property by yourself!
POOL MANAGER	GE 200	Football Pool manager.
RUNNING	GE 201	Training program for runners.
TEAM MANAGEMENT	GE 202	Store information on players' performance, team and league statistics.
GOLF HANDICAPPER	GE 203	Calculate a PGA handicap for any number of players (BASIC req'd)
LOTTO CHALLENGER	GE 204	Another great lotto number generator!
New	**New**	**New**
G.I.F.T.S.	GE 205	A real time-saver! A database of gifts!
WINE	GE 206	A database for wine lovers.
RECIPES II	GE 208	Another great selection of recipes in a self-contained program.

UTILITIES
Disk & Program Management...

DOS TUTORIAL	UT 107	Master DOS with this able mentor
BATCH FILE TUTORIAL	UT 109	Learn and utilize batch (.bat) file processing. Time saving, very useful
DOS TIPS	UT 110	(2 disks) Advanced DOS tutorial
KARC/PKXARC 3.6	UT 126	Latest version of a great file compression/extraction tool.
LAPTOP GASGUAGE	UT 135	Monitors laptop battery and lets you know when to recharge
POINT & SHOOT	UT 136	A far better hard disk backup/restore utility than DOS provides!
HD UTILITIES	UT 139	A useful set of hard disk utilities
BEST BATCH UTILITIES	UT 140	Put some punch into your batch files with the aid of these 25 programs
YEAR PLANNER	UT 141	This powerful organizer prints wall calendars!
ARCHIVER 1.3	UT 142	Here's a REALLY USEFUL program - an archiving shell. Makes archiving and unarchiving a breeze with pull-down menus.
MENUX 3.1	UT 145	Excellent HD menu with multiple windows
SCREENSAVER 1.05	UT 148	A memory resident screen blanking utility requiring less than 2K of memory.
ANADISK	UT 149	Analyzes, inspects, edits, repairs and copies diskettes.
EMU	UT 150	Hard/Soft Disk manager. A full-featured DOS shell
BURN-IN & DIAGNOSTICS	UT 151	Handy disk - performs extensive system checks and diagnostic routines.
DISKCOPY/FORMAT UTILITIES	UT 152	Plenty of super utilities for copying and formatting disks
HD-TEST	UT 154	Hard disk tester. Supports floppy testing also
HARD DISK BACKUP	UT 155	Comprehensive utility for backing up your hard disk safely and quickly.
MASTER MENU	UT 156	Full-featured hard disk menu application.
TURBO COPY	UT 157	Format/copy/verify diskettes fast!
EISSINGER UTILITIES	UT 158	A rich variety of DOS commands
DOSAMATIC	UT 159	Mutli-tasking disk management.
WINDOWS UTILITIES	UT 161	A great collection of handy utilities.
New	**New**	**New**
NEWKEY	UT 166	Assign common keystroke sequences to a single keystroke.
MULTI-EDIT	UT 167	Superior ASCII text edito.
THEDRAW	UT 168	(2 disks) Color and monochrome screen editor.
AWK	UT 169	Pattern scanning and processing language. Searches files for patterns and performs specified actions on lines or fields of lines that contain those patterns.
MAGIC MENUS	UT 170	(2 disks) DOS menuing utility with added features: user-defined pull-down and pop-up menus, instant disk directory, "window to DOS," etc.

GRAPHICS
Design, Draw, Animate, Clip...

PC-KEY DRAW	GR 101	(4 disks) Magical drawing/art program.
SIMCGA	GR 102	Run CGA progs with Hercules type cards
DANCAD3D	GR 106	(2 disks) The best for 3-D wireframe with all conceivable options
PRINTSHOP GRAPHICS	GR 108	3 additional libraries, over 200 additional pics - needs PrintShop
PRINTMASTER GRAPHICS	GR 109	3 additional libraries for PrintMaster
PRINTSHOP GRAPHICS II	GR 111	Another 500+ images for the PrintShop program
PRINTMASTER GRAPHICS II	GR 112	(2 disks) Another 500+ images for PrintMaster
VENTURA CLIP ART	GR 113	(5 disks) Office/business subjects for Ventura Publisher
VENTURA PUBLISHER TUTOR	GR 118	Packed with utilities and instruction for VP - recommended for all users
WP/PM/PCC CLIP ART	GR 119	(11 disks) Art for Pagemaker and WordPerfect 5.0 in PCC format.
FIRST PUBLISHER GRAPHICS	GR 121	(3 disks) Full of pictures and symbols for First Publisher in .PCX format
VGA PAINT	GR 122	At last! A superb graphics and painting program just for VGA owners
EGA FONTS	GR 123	Here are more than 50 fonts to liven up your EGA display
HERCBIOS	GR 124	New! 43 lines by 90 columns on Hercules mono!
PRINTSHOP GRAPHICS III	GR 125	(2 disks) More superb art from Jim Cooper and his wife
PRINTMASTER GRAPHICS III	GR 126	(2 disks) And the same for PrintMaster!
COOPER GRAPHICS	GR 127	(3 disks) Clipart in PCX format!
COOPER GRAPHICS #2	GR 129	(2 disks) Clipart (Print Shop, Printmaster, First Publisher) Includes American sign language, cartoon characters - 200 images in all!
EZGRAPH 2.0	GR 130	Create presentation quality line graphs from your scientific data!
KID PAINT	GR 131	Coloring book on computer! Children color with 30 colors.! (EGA req'd)
4TH OF JULY	GR 132	A stunning fireworks display! (CGA req'd)
CLASSICS ILLUSTRATED	GR 133	(2 disks) Classics Illus. Comics! 16 of the best covers! (CGA req'd)
PC-KEY DRAW LIBRARY #1	GR 134	A disk full of graphic (.PIC) images for PC-Key Draw (GR 101)
NAGEL ART	GR 136	Fascinating collection of .GIF art displayed in EGA or VGA .
AUTOFLIX MOVIE PROJECTOR	GR 138	(2 disks) For EGA and hard disk, this demo shows off PC animation.
MANDELBROT	GR 139	(2 disks) Menu-driven Mandelbrot generator.
MANDELBROT MAGIC	GR 140	Create, manipulate and display fractal color displays.
COOPER GRAPHICS #3	GR 141	(2 disks) Birds, sodiac, faces, pets, 200 images!
CLIPART SAMPLER	GR 142	Delightful clipart in .PCX format!
HEADLINES SAMPLER	GR 143	Headline clipart in .PCX format.
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Circle Reader Service Number 170

Company	Board	Speed (MHz)	Baby Size	Standard Size	BIOS	No. of Slots	Slot Configuration	Cache Available	Populated	Base System Available	Warranty	Prices		Comments
Chicony	CH-386-20	20	●	○	AMI	8	3/8, 4/16, 1/32	○	○	○	1 year	$650		Includes shadow RAM, separate CPU and I/O speeds, interleaf and page-mode operation, and rechargeable battery backup; supports up to 8MB of RAM
Computrade	Novas 386-20 MHZ	20	●	○	AMI	8	2/8, 8/16, 1/32	○	●	1MB	1 year	$945 (1MB)		Price includes 2 serial ports and 1 parallel port; offers only 387 socket; supports up to 8MB of RAM
Computrade	Novas 386-20 MHZ AT	20	○	●	AMI	8	2/8, 8/16, 1/32	○	●	1MB	1 year	$1,055 (1MB)		Price includes 2 serial ports, 1 parallel port, 287 and 387 Weitek sockets; supports up to 16MB of RAM
Computrade	Novas 386-25 MHZ C & T Chipset	25	○	●	AMI	8	2/8, 6/16	○	●	1MB	1 year	$1,445 (1MB)		Price includes 200-watt power supply, AT case, 2 serial ports, 1 parallel port, and sockets for 287-387 Weitek; supports up to 16MB of RAM
Computrade	Novas 386-25 MHZ Cache	25	○	●	AMI	8	2/8, 6/16	32K	●	1MB	1 year	$1,645 (1MB)		Price includes AT case, 200-watt power supply, 2 serial ports, 1 parallel port, and 287/387 Weitek; supports up to 16MB of RAM
Computrade	Novas 386-33 MHZ Cache	33	○	●	AMI	8	2/8, 6/16	64K	●	1MB	1 year	$1,845 (1MB)		Price includes AT case, 200-watt power supply, 2 serial ports, 1 parallel port, and 287/387 Weitek sockets; supports up to 16MB of RAM
Computrade	Novas 486 C & T Chip-set/PEAK 486	N/A*	○	●	AMI	8	2/8, 6/16	●	●	1MB	1 year	$2,045 (1MB)		Price includes AT case, 200-watt power supply; supports up to 16MB of RAM; 1990 release; prices and specs subject to change
C² Micro Systems	80386 Model 8B	20	●	○	AMI; Phoenix is optional	8	3/8, 5/16	○	●	○	1 year	$1,175 (1MB)	$1,030 (base system)	Base system includes CPU, standard case, 230-watt power supply, floppy/hard disk controller, floppy drive, and 101-key keyboard
C² Micro Systems	80386 Model 8A+	20 or 25	○	●	AMI; Phoenix is optional	8	1/8, 6/16, 1/32	○	●	1MB	1 year	$1,150 (1MB, 20 MHz)	$1,280 (1MB, 25 MHz)	Base systems available for $1,025 (20 MHz) and $1,145 (25 MHz); base system includes standard case, 230-watt power supply, floppy/hard disk controller, and 101-key keyboard; board supports up to 10MB of RAM

C² Micro Systems	80386 Cache Model 5C	25 or 33	○	●	AMI; Phoenix optional	8	2/8, 5/16, 1/32	32K	●	4MB	1 year	$2,250 (4MB, 25 MHz)	$3,160 (4MB, 33 MHz)	Base systems available for $1,755 (25 MHz) and $2,585 (33 MHz); systems include CPU, AT case, 230-watt power supply, floppy/hard disk controller, floppy drive, and 101-key keyboard; board supports up to 16MB of RAM
Digicom	DIGIS 386CM-25	25	○	●	AMI or Award	8	2/8, 6/16	32K	○	16MB	1 year	$1,200 16MB		Unlimited technical support
DTK Computer	PEM 2000	20	○	●	DTK BIOS	8	2/32, 5/16, 1/8	○	●	○	1 year	$975	$1,199 (base system)	Base system is desktop-size; tower-case-size base system available for $1,349; technical support available
DTK Computer	PEM-2030B	20	●	○	DTK BIOS	8	1/32, 5/16, 2/8	○	●	○	1 year	$1,025	$1,275 (base system)	Technical support available
DTK Computer	PEM-2500	25	○	●	DTK BIOS	8	1/32, 6/16, 1/8	64K	●	○	1 year	$1,749	$2,099 (base system)	Technical support available
DTK Computer	PEM-3300	33	○	●	DTK BIOS	8	1/32, 6/16, 1/8	64K	●	○	1 year	$2,399	$2,599 (base system)	Technical support available
DYNA Computers	386 Cache Board	25 or 33	○	●	AMI	9	5/16, 3/8, 1/32	64K	○	1MB or 4MB	1 year	$2,495 (1MB, 25 MHz)	$3,395 (4MB, 25 MHz)	Supports Intel 80386 and Weitek 3167; 24MB RAM capacity; 33-MHz available with 4MB of RAM for $3,995
Hauppauge Computer Works	386 Mother-Board/AT	16	○	●	Award 386	8	4/16, 4/8	○	○	1MB	1 year	$1,595 (1MB)		Upgrades 286 to 386; 12MB RAM capacity; supports OS/2; 30-day money-back guarantee
Jaton	Gene II 386-20/25 Main Board	10(20) or 5(6)	○	●	Phoenix	7	5/16, 2/8	○	○	○	1 year	Call for price		Math coprocessor socket; shadow RAM for system BIOS
JDR Microdevices	MCT-386MB25	25	○	●	AMI	8	1/32, 5/16, 2/8	○	○	○	1 year	$1,049		Keyboard-selectable speeds; 16MB RAM capacity; shadow RAM for BIOS and video; supports interleaved memory
Legend Technology	80386-33	33	●	○	Phoenix	8	1/8, 6/16, 1/32	32K	●	4MB	1 year	$4,295 (4MB)	$2,495 (base system)	Includes 170MB Maxtor XT 4170E, tower-case mono system
Monolithic Systems	MicroFrame 386M	16, 20, or 25	○	●	Phoenix	8	7/8-16, 1/8-16-32	○	●	8MB	5 years	$3,575 (8MB, 16 MHZ)	$4,175 (8MB, 25 MHz)	Base system available for $1,415; memory slots allow optional 16MB of 32-bit system memory; technical support available
Monolithic Systems	MicroFrame 386CT	20 or 25	○	●	Award	8	6/8-16, 2/8-16-32	32K	●	8MB	5 years	$4,295 (8MB, 20 MHz)	$4,695 (8MB, 25 MHz)	Base system available for $1,975; memory slots allow optional 24MB of 32-bit system memory; technical support available

Company	Board	Speed (MHz)	Baby Size	Standard Size	BIOS	No. of Slots	Slot Configuration	Cache Available	Populated	Base System Available	Warranty	Prices		Comments
Monolithic Systems	MicroFrame 386CX	20 or 25	○	●	Award	14	10/8-16, 4/8-16-32	32K	●	8MB	5 years	$4,585 (8MB, 20 MHz)	$5,065 (8MB, 25 MHz)	Base system available for $2,240; board is large-size, AT-compatible board appropriate for tower-style enclosures; technical support available
Multi-Industry Tech.	M38620	20	●	○	AMI	8	1/32, 3/8, 4/16	○	○	○	1 year	$610		Supports shadow RAM, page interleave, and up to 8MB of RAM
Multi-Industry Tech.	M38620C	20	●	○	AMI	8	1/32, 3/8, 4/16	64K	○	○	1 year	$995		Supports EEMS 4.0 and 2MB RAM card
Pioneer Computer	Pioneer Vantage 386SX	20	●	○	AMI	7	5/16, 2/8	○	●	○	2 years	$375		Features shadow RAM; offers 8MB RAM capacity; supports 80386SX; made in the U.S.
Shecom	386/20 Mother Board	20	N/A	N/A	Award	8	5/16, 2/8, 1/32	●	●	○	2 years	$950		Includes page interleave and shadow RAM
Shecom	386/25 Mother Board	35	N/A	N/A	Award	8	5/16, 2/8, 1/32	32K	●	○	2 years	$1,750		Capacity for up to 8MB of RAM
Shecom	386/33 Mother Board	33	○	●	Award	8	5/16, 2/8, 1/32	32K	●	1MB	2 years	$2,595		
Soletek Computer Supply	MB386SX	16	○	●	Award	8	6/16, 2/8	○	○	○	1 year	$320		Boards are tested twice before shipping; board supports shadow RAM and page-mode operation; technical support available
U-Tron	16 MHz, 80386SX	16	●	○	Award	8	6/16, 2/8	○	●	1MB	90 days parts, 1 year labor	$385	$545 (1MB)	Base system available for $695, including case, power supply, system board, and 1MB; board uses the Intel CPU and chip set
U-Tron	80386 20/25	20 or 25	●	○	AMI	8	1/32, 5/16, 2/8	○	○	1MB	90 days parts, 1 year labor	$575 (20 MHz)	$735 (20 MHz, 1MB)	25-MHz available for $645 or $805 with 1MB; 16MB cache board will be available; technical support available
Wedge Technology	WT386-16SX	16	●	○	AMI	8	1/32, 5/16, 2/8	○	●	1MB	1 year	$627	$741 (1MB)	Base system available for $741; supports up to 8MB of RAM; technical support available

Wedge Technology	WT386-20A	20	o	●	Phoenix	8	1/32, 5/16, 2/8	o	●	1MB	1 year	$1,164	$1,239 (1MB)	Base system available for $1,239; supports up to 8MB of RAM; technical support available
Wedge Technology	Wedge Turbo 386	20 or 25	o	●	Award or Phoenix	8	N/A	o	o	1MB	1 year	Call for price		Expandable to 16MB of RAM; shadow-RAM capability
Wedge Technology	WT386-25B	25	●	o	AMI	8	1/32, 5/16, 2/8	o	●	1MB	1 year	$962	$1,137 (1MB)	Base system available for $1,137; supports up to 8MB of RAM; technical support available
Wedge Technology	WT386-25C	25	o	●	Phoenix	8	1/32, 6/16, 1/8	32K	●	1MB	1 year	$1,864	$1,939 (1MB)	Base system available for $1,939; supports up to 14MB of RAM; technical support available
Wedge Technology	WT386-33C	33	o	●	Phoenix	8	1/32, 6/16, 1/8	32K	●	1MB	1 year	$2,217	$2,292 (1MB)	Base system available for $2,292; supports up to 14MB of RAM; technical support available

● — Yes o — No N/A — Information not available

PC

For more information about any product listed in this buyer's guide, contact the manufacturer at the address listed below.

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Suites G & H
S. San Francisco, CA 94080
(800) 882-7475

Chicony
Eastern Regional Office
1637 Stelton Rd.
Suite 6
Piscataway, NJ 08854
(201) 819-8300

Chicony
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Orange, CA 92667
(714) 771-6151

Computrade
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San Jose, CA 95112
(408) 441-6500

C² Micro Systems
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Fremont, CA 94539
(415) 683-8888

Digicom
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Sunnyvale, CA 94086
(408) 245-1580

DTK Computer
15711 E. Valley Blvd.
City of Industry, CA 91744
(818) 333-7533

DYNA Computers
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San Jose, CA 95134
(408) 943-0100

Hauppauge Computer Works
175 Commerce Dr.
Hauppauge, NY 11788
(516) 434-1600

Jaton
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San Jose, CA 95131
(408) 434-6787

JDR Microdevices
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San Jose, CA 95124
(408) 559-1200

Legend Technology
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Milpitas, CA 95035
(408) 942-1220

Monolithic Systems
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Englewood, CO 80112
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Multi-Industry Tech.
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Shecom
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Unit G
Yorba Linda, CA 92686
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Soletek Computer Supply
131 Ethel Rd. W
Suite 4
Piscataway, NJ 08854
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Funnels & Buckets (4535)—A fun, more effective way to teach kids math. It's a fun math learning game!

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DOS-a-matic (4559)—A menu-driven program that makes using DOS easy!

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SimCGA (4305)—Utilities which allow you to run many programs that require CGA on your monochrome system.

Grabber (4342)—A memory-resident program that will save to disk any screen image. You can then run a slide-show of saved images. CGA

PC-DeskTeam (4375)—Large collection of Sidekick-like desktop accessories (clock, calendar, phone book, etc.)

Master Menu (4386)—Puts all the programs on your hard disk onto an auto-booting, one-touch selection menu.

Q-Modem SST (4715–4717)—A modem telecommunications package which is powerful and versatile. (3 Disks)

GRAPHICS/PRINTING

Epson Utilities (4333, 4334)—A set of fonts and utilities to enhance your printer's print quality. (2 Disks)

LaserJet II Fonts (4335, 4336)—Several new soft fonts for the HP-LaserJet II and compatible printers. (2 Disks)

City Desk (4340)—A simple desktop publishing program for newsletters.

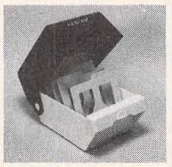
Charts Unlimited (4343)—A fantastic design tool for creating almost any type of chart, schematic or diagram. Excellent printing capabilities. CGA

PC-Draft (4344, 4345)—A high-quality drawing/painting program. (2 Disks) CGA

Express Graph (4161)—Turns raw data into great graphs and charts. A picture is worth a thousand words!

Insta-Calendar (4835)—This calendar design tool and printer is easy to use.

Banner Maker (4801)—Make banners of various styles and sizes. Requires an Epson or compatible printer.



FREE Disk Holder

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PrintShop Graphics (4397)—A large collection of PrintShop clip art.

PrintMaster Graphics (4398)—Lots of clip art for PrintMaster users.

On-Side (4387)—Prints your spreadsheets (or anything) sideways!

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Church dBASE (4812)—Automates membership record keeping for church congregations and other organizations.

SeedMaster (4837–4849)—The complete King James *BIBLE* on disk! Allows quick access to any word, phrase, topic. Requires hard disk. (13 Disks) HD

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ELISA (4805)—Let the famous computer psychiatrist analyze you. It's fun!

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Biorhythm (4826)—Generates a chart for any month and prints the results.

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Striker (4400)—Arcade helicopter attack game. Bomb and shoot enemy targets. (CGA—Will not work with EGA/VGA)

Q-Bert (4403)—Play the famous arcade hit on your computer. CGA

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Programs as low as $1.49 per disk!

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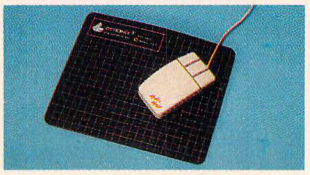

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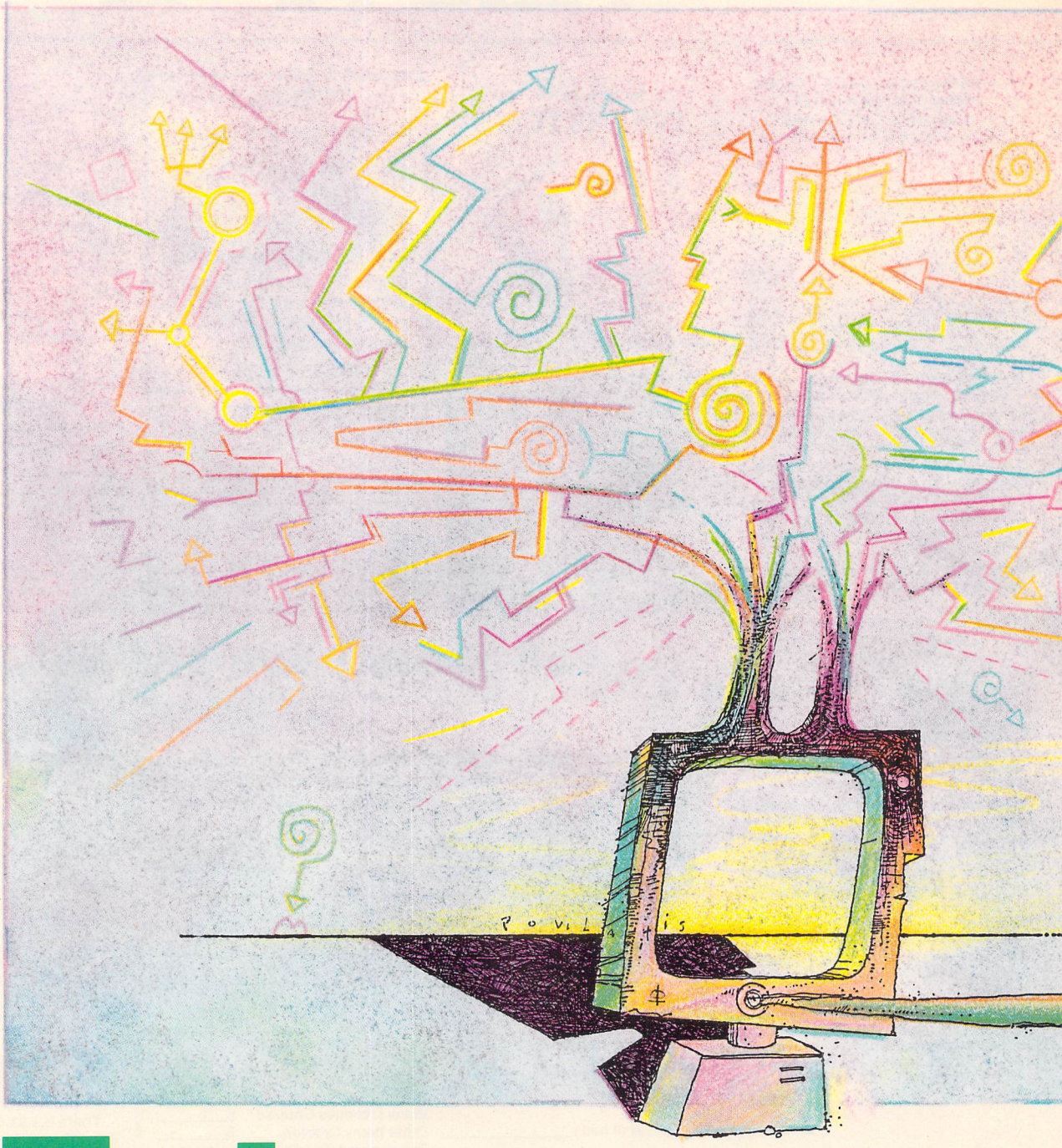


Future Computing

David Povilaitis

Computers as powerful as the human brain? It sounds like science fiction, but it will soon be science fact. Join us for a firsthand look at an exciting new science and a sneak preview of some amazing applications.

Kevin E. Martin

Imagine a computer that could answer your telephone and recognize the voice of each caller. It could talk to your best friend while you're in the shower and tell the salesman that you're out of town. This computer would be a powerful and complex machine with a measurable IQ, closer in more ways to a human being than to a traditional computer.

Sound impossible? We may be closer to achieving this than you think. Scientists working in the field of neural computing are realizing the dream of a truly intelligent computer. Because they use the human brain—still the most awe-inspiring computer in the known universe—as the model for their computer design, neural computing has become one of computing's latest buzzwords.

In this feature, we'll see how scientists at the cutting edge of this technology are using what they know about the brain to develop more powerful computer designs. We'll investigate some of these designs and discover how each mimics the brain in a different way. Finally, we'll journey to the not-too-distant future and see how this dynamic new technology will reshape our everyday world.

To understand neural computing, we have to study the most powerful and portable supercomputer—the human brain.

Mapping the Brain

To understand the full potential of neural computing, we first have to study the most powerful and portable supercomputer—the human brain. Your brain is made up of many small cells called *neurons* that are linked in a complex network. A human brain has approximately 100,000,000,000 neurons, and a typical neuron is connected to 10,000 other neurons. This means that your brain has approximately 1,000,000,000,000,000 interconnections.

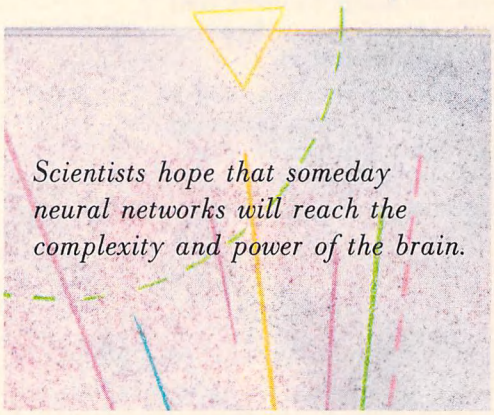
Needless to say, this makes it extremely difficult to create a working model of the brain. Even with the rapid growth in computer technology, we're only just now beginning to build computers that approach the complexity of the brain.

The neuron is actually quite slow when compared to the silicon computer chips of today. The fastest silicon chips are about 100,000 times faster than the neuron. You might assume that a computer would be able to think much faster than a human, but that's not the case: Today's computers solve problems much more slowly than the brain does.

Future Computing

While we've known for some time how neurons work individually, we've only recently begun to understand how they interconnect to form the brain. But how does the brain learn, and how is it able to adapt to any type of environment?

In 1949, Donald O. Hebb provided a possible answer with a new learning model for the brain. His revolutionary theory states that when one cell is near enough to repeatedly excite another cell, a change takes place in one or both of the cells. In this way, the relationship between the cells becomes more efficient.



Scientists hope that someday neural networks will reach the complexity and power of the brain.

War of the Worlds

Using what they've learned about the brain's neurons, today's scientists are building computer systems that operate in a way that's similar to the way the brain works. These new computer designs are called *neural networks.* The scientists' goal is to make the neural networks more and more complex until they eventually reach the complexity of the brain.

Even though scientists have developed many different types of neural networks over the past 40 years, we're just beginning to see useful applications. The delay was caused by a 1969 book, *Perceptrons.* It showed how one type of neural network, called a *linear perceptron,* could learn only a limited number of patterns. Many researchers felt that if networks were limited in this way, the search for an intelligent computer must lay elsewhere.

At the time of the book, a debate was raging over whether the artificial-intelligence community should emphasize neural networks or symbolic programming (another branch of artificial intelligence). After the book was published, neural networks took a back seat, and symbolic programming became the dominant force in artificial-intelligence research.

As a result, we have many tools and programs (such as expert systems) that were developed over the last 20 years with symbolic programming. Since 1982, however, neural computing has been the focus of renewed research, and the debate has resumed over which approach is best.

Model Behavior

Let's take a brief look at the three kinds of neural networks in use today: associative memory, optimization, and self-organization. While each displays features found in the brain, the most successful models combine features from all three types in order to respond to a variety of situations.

Associative memory neural networks can associate two or more different patterns. An associative memory model might be used in simple visual processing to recognize someone's handwriting or to associate a person's picture with that person's name. This is one of the most common functions of the human brain and is essential to developing a model of the brain.

The *optimization* neural network offers an elegant technique for solving extremely complex problems. Consider a sales representative who must travel to 10 cities over the next week. There are 3,628,800 possible pathways between the cities. The sales rep needs to find the optimal path that will allow the maximum amount of time in each city. A human can come up with an optimum path for a few cities, but what happens when there are 30, or 100, or 1000 cities? An optimization neural network would make short work of this problem, while a conventional computer system would have to crunch away for a much longer time.

The third type of neural network is the *self-organizing* model. This type of neural network is designed to handle many different environments and adapt to unexpected changes in an environment. It determines the salient features of the environment and

Neural Computing by the Book

The Mind's I: Fantasies and Reflections on Self and Soul, composed and arranged by Douglas R. Hofstadter and Daniel C. Dennett (Basic Books, 1981; 502 pages; $13.95), is for those interested in a philosophical treatment of the mind. It's an excellent choice if you want to learn something about the way the mind works—without a nuts-and-bolts anatomy lesson.

Neural Computing: Theory and Practice, by Philip Wasserman (Van Nostrand Reinhold, 1989; 256 pages; $36.95), offers a gentle introduction for both the nonmathematician and the theorist. It covers all the current paradigms in detail and has a bibliography at the end of each chapter.

Neurocomputing: Foundations of Research, edited by James A. Anderson and Edward Rosenfeld (MIT Press, 1988; 727 pages; $55.00), is for the mathematically inclined. It includes papers from the beginning of neurophysiology and continues on to the most recent research.

classifies the environment into different categories.

Which of these three types of neural networks is the most popular today? The associative memory network that self-organizes itself with a method called *back propagation* is now the leader. This system can learn the features of its input environment. It can thus be used in a variety of applications because you can train it for any environment.

Meet George Jetson

Theory is fine, but what about practical applications? Where will we begin to see the brainlike power of neural networks in our everyday lives?

One of the first places we're likely to see it is in the financial community. Banks have mountains of information about the past performance of their loan applicants. A neural network could determine the features of the applicants that make them a high or low risk. It could then analyze new applicants and place each into a high- or low-risk category.

Another use in the financial community would be on Wall Street. Ever since the beginning of stock trading, stock brokers have tried to predict the action of the stock market. In the past year, several brokerage firms have begun to use existing neural networks to analyze the market and predict its movement for any given day.

In the automotive industry, robots have replaced many of the assembly line workers, but there are still many jobs that only a human can do. But some monotonous jobs could be performed by tomorrow's neural computers.

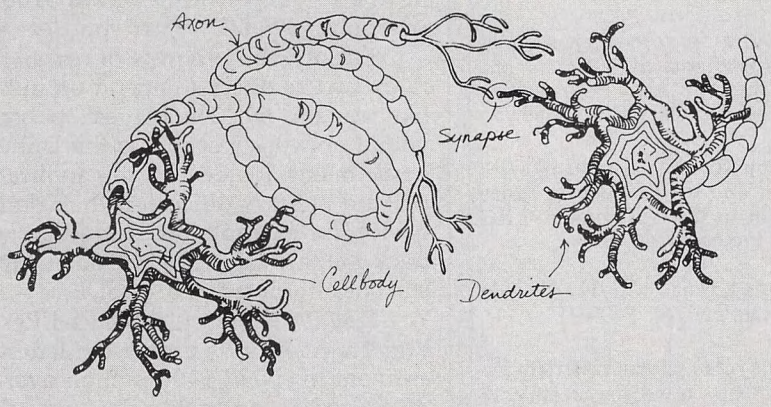
For example, when a part rolls off the assembly line, a quality control worker checks it to see that it was manufactured correctly. Although inspecting the parts is beyond the capability of today's computers, neural computers would be able to manage the task.

Imagine being able to tell your computer what to type and having the machine do all the work.

Not only will neural computers be able to see more intelligently, but they'll also be able to hear and speak smarter. Instead of typing a letter to a corporation, you'll be able to tell the computer what to type and have the computer do the work. Eventually, computers will be able to correct your grammar mistakes and suggest alternative sentences (sounds great, doesn't it?).

Neural robots may be able to keep us out of harm's way. An autonomous robot that can see, hear, and speak would be able

How the Brain Works



You might think, from the cartoons you saw as a child, that the brain is a giant light bulb or a set of interlocking gears. In fact, the brain performs its magic with subtle chemical changes that send electrical signals from cell to cell.

Each neuron is divided into three main parts: the body, the dendrites, and the axon. The dendrites are located close to the cell body. Their function is to collect signals from other cells and send the signals to the cell body. These signals are built up over time within the cell body. When the total number of signals reaches a critical level, the neuron body sends its signal down the axon.

The cells communicate by sending signals from one cell's axon to another's dendrites. The signals are actually chemical transmitters. When the signals are received by the dendrites, they build up an electric potential within the cell body. It's this electric potential that is sent down the axon and delivered to another cell's dendrites. The electric potential is transferred from one neuron to another by way of a *synapse*.

Neural computing's biggest contribution may be the insights it provides into the brain. While today's psychologists treat mental illness by studying a patient's behavior patterns, someday brain specialists may correct mental problems by examining the structure of a patient's brain and its chemical and electrical imbalances.

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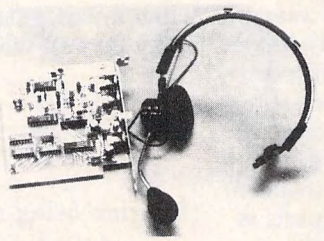

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Future Computing

to perform tasks that are too dangerous for a human. A project is currently underway to develop a robot that can maneuver around a nuclear power plant and inspect the integrity of the reactor from the inside.

In the medical field, neural computing could be used to monitor and analyze the heartbeat of a patient. It could help doctors respond more efficiently to sudden changes. With the neural network observing the heartbeat, the doctor could more accurately assess the entire situation.

Finally, neural networks could be used to aid the handicapped. Once a voice-recognition neural network is developed, it could be used to help the hearing impaired. A neural network that analyzes handwriting could read a letter to a visually impaired person. Neural networks could usher in an exciting new era of independence for people with all kinds of disabilities.

Young Frankenstein

If you're so inclined, you could start your own neural network research project. More than 15 companies sell development systems with the latest neural computing technology, but most of these systems are expensive. If you have a PC, expect to pay from $100 to a whopping $25,000 to get your feet wet.

To start your own neural network research project, you'll need to spend between $100 and $25,000.

Luckily, the progress of research in neural networks doesn't depend on individuals like you and me. The biggest sponsor of neural network research is the United States government. It's developing applications that will aid military officers in their duties. One device, for example, would recognize and track military targets with sonar. Most of the current efforts are part of SDI.

DARPA (Defense Advanced Research Projects Agency) is urging the federal government to spend $400 million over the next several years to develop this technology. If the government supports DARPA, we will begin to see many of these applications within the next five to ten years.

While the early neural computing applications will be expensive, we should eventually see the technology filter down to consumer products. That's when the phrase *user friendly* would really mean something. If all goes well, you might have your *own* intelligent computer—one you can really talk to—by the end of the century. PC

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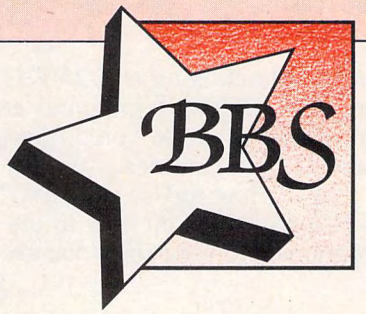


Online Shopping

George Campbell

Let's go shopping! That seems to be the battle cry around the country these days. Malls are crowded with people searching for everything from books to big-screen TVs. But there's a new type of mall, and you don't need a car to get there. Your PC, along with a modem and membership in one of the national BBS systems, like CompuServe, GEnie, or Prodigy, is the only transportation you need.

As soon as the number of people using online services grew to the six-figure level, retailers began to offer their products to modem owners. Today, there are hundreds of outlets available via phone. They offer everything from exotic chocolates and cookies to big-ticket items like computers and even condominium rentals.

Here's how it works. Once you're connected to an online service, you can access its shopping features either from a menu or by using a shortcut command. On GEnie, just type MALL to get to the GEnieMall menus. CompuServe users can enter GO MALL at any prompt. If you're a Prodigy user, you can choose *Shopping* at the main menu.

Shopping Spree

On any of these systems, the next thing you see is a menu that displays your options. Using these menus, you can visit stores like Spiegel, J. C. Penney, and Time-Life Books, or you can compare prices on computer hardware and software by shopping more than one source. You can order flowers to send to a loved one or get the latest price quote for your dream car. On GEnie, you can order gourmet cookies from Gimmee Jimmy's Cookies. Prodigy even offers grocery shopping in some cities, with direct delivery to your home.

After choosing a retailer, you'll have an opportunity to browse through the available products and compare prices. Your fingers do the walking through the aisles of these online stores. If you're a Prodigy subscriber, you'll often see a graphic image of the product. The other services provide only brief text descriptions.

If you find something you like and decide to buy, your major credit card is the key. Most online outlets accept MasterCard, Visa, American Express, and the Discover card. Products are normally shipped directly to your home or business. Next-day shipping is also available from most retailers for an extra charge.

If you're mainly interested in shopping for computer supplies, you have yet another option. The On-Line Store, available on CompuServe, also operates a multiline BBS of its own. There you can find demos of popular software programs along with an extensive list of computer hardware and software. Complete descriptions are available online for many products. You can access the On-Line Store's BBS by calling (805) 650-0193 with your modem. The BBS supports speeds up to 2400 baud. Just remember that you'll also have to pay long-distance telephone charges.

Dialing for Discounts

Since you want to find the best prices for your purchases, it's important to do some comparison shopping. Online prices vary widely for most products, but you probably won't find absolute rock-bottom prices. Since retailers have to pay the online service for the right to display their wares, there's often a small premium to pay.

Prices of products are often lower than those you'd pay in a local retail store, but higher than the mail- or phone-order prices you find in catalogs and magazines. One online store quoted a price of $459 for a Seagate ST251-1 hard disk. That's a good discount, but the same 40-megabyte hard disk was available through a computer magazine ad for only $329.

Don't forget that you also have to pay for your time online. With prices ranging from $9.95 per month on Prodigy to $12.50 per hour at 2400 baud on CompuServe, you should factor in your online costs when you shop by modem.

Most online retailers offer feedback systems for their users. While online, you can ask questions about products and then read a personal response within 24 hours. Also, the services themselves can sometimes help mediate disputes between consumers and individual retailers.

Descriptions of products are sometimes skimpy when you shop by modem. Even Prodigy, with its graphics screens, gives you only a rough view of an item. It's best to know as much as possible about a product before you order.

Attention Shoppers

Shopping with your PC's keyboard can be fun, but make sure you get a good deal. Here are some tips to help you get the most from your online shopping trips:

- Use money-saving slow modem speeds if your service offers price breaks for 300-baud access.
- Capture screen information to a file for later study.
- Investigate the features of a product before you buy.
- Always compare prices by checking local retailers and mail-order firms.
- Avoid impulse buying. Check around; then call back if you decide to buy.
- Be sure to add shipping costs when considering a purchase.
- Use an online retailer's help line if you need more information.

This Issue's Programs

For the March issue of *COMPUTE!'s PC Magazine*, we dug through the latest shareware programs and found four we know you'll enjoy. On this issue's disk, you'll find a complete checkbook system plus three valuable utilities.

See "How to Use the Disk," elsewhere in this issue, for complete instructions on how to use our menu system to install these programs and read their documentation.

CheX

Over the years, programmers have offered a number of checkbook-management programs. We think *CheX*, written by California programmer, Richard Young, is one of the best.

You can use *CheX* to maintain any number of checking accounts, with easy data entry and balancing. The program supports a multitude of expense categories that can simplify your tax calculations. *CheX* isn't limited to checking accounts, either. You can use the program to manage your savings accounts and credit-card accounts, or you can use it for simple bookkeeping chores.

What's more, *CheX* can print your checks with either individual checks or pin-feed checks, and you can customize the program for any check format. Another printing option lets you create a hard-copy of the entire checkbook for your records.

The program's menu-driven interface is exceptionally easy to use, with detailed online help available for every command. The help system even lets you search for keywords and displays pages from the manual.

Other valuable features let you set screen colors and export comma-delimited files for use in other programs. A graphing feature in *CheX* can display your checkbook as a bar graph. There's even a built-in calculator for simple math operations.

CheX requires as little as 256K to run, can use DOS 2.1 or higher, and works fine with all monochrome or color monitors. *CheX* is a shareware program with only a $20 registration fee.

Viruscan

Viruses were back in the news last October. Everyone held their breath, waiting to see if the Columbus Day Virus or the Jerusalem Virus would strike. Despite all the worry, nothing much happened.

Viruses are real, if rare. While you'll probably never be attacked, it doesn't hurt to be careful. What you need is a program that can check your disks and directories for known viruses before they strike. John McAfee, a Silicon Valley programmer, has answered the call with his program, *Viruscan*.

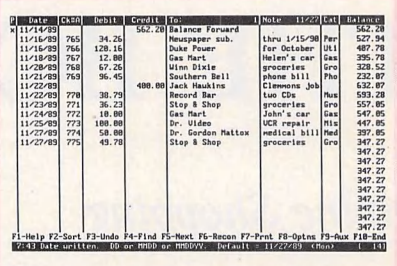
Unlike most virus-protection schemes, which can only find viruses *after* they strike, *Viruscan* can find viruses before they do any damage. The program actually looks inside your files for the viruses themselves.

You can use *Viruscan* in two ways to look for more than 50 known viruses. It can check your entire system, searching for trouble in every EXE and COM file on your hard disk. Even better, it can check specific files, letting you make sure a new program is safe before you use it.

How long *Viruscan* takes to check your hard disk depends on its size and the speed of your computer. On a typical 12-MHz AT clone, *Viruscan* takes less than four minutes to check 32 megabytes of files.

Viruscan will run on any IBM-compatible PC, but it needs a minimum of 256K of memory and DOS 2.1 or higher. Before running the program, be sure to read the documentation contained in the file SCANV49.DOC.

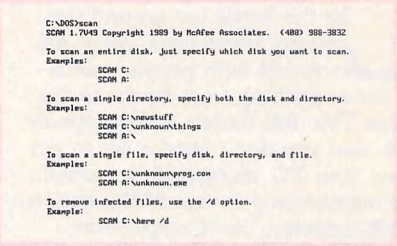
The program is shareware with a registration fee of only $15.



P	Date	Ck#	Debit	Credit	To:	Note 11/22	Cat	Balance
*	11/14/89			562.28	Balance Forward			562.28
	11/16/89	765	34.26		Newspaper sub.	thru 1/15/90	Per	527.94
	11/16/89	766	120.16		Duke Power	for October	Uti	407.78
	11/18/89	767	12.00		Gas Mart	Helen's car	Gas	395.78
	11/20/89	768	67.26		Winn Dixie	groceries	Gro	328.52
	11/21/89	769	96.45		Southern Bell	phone bill	Pho	232.07
	11/22/89			400.00	Jack Haukins	Clemmons job		632.07
	11/22/89	770	38.79		Record Bar	two CDs	Mus	593.28
	11/23/89	771	36.23		Stop & Shop	groceries	Gro	557.05
	11/24/89	772	10.00		Gas Mart	John's car	Gas	547.05
	11/25/89	773	100.00		Dr. Video	VCR repair	Mis	447.05
	11/27/89	774	50.00		Dr. Gordon Mattox	medical bill	Med	397.05
	11/27/89	775	49.78		Stop & Shop	groceries	Gro	347.27
								347.27
								347.27
								347.27
								347.27
								347.27
								347.27
								347.27
								347.27

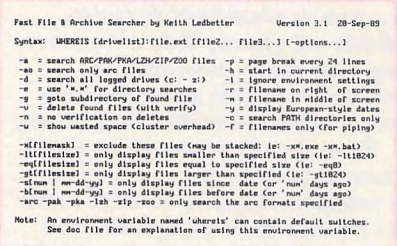
F1-Help F2-Sort F3-Undo F4-Find F5-Next F6-Recon F7-Print F8-Optns F9-Aux F10-End
2:43 Date written. DD or MMDD or MMDDYY. Default = 11/22/89 <Mon> 1 14

CheX *helps you balance your checkbook.*



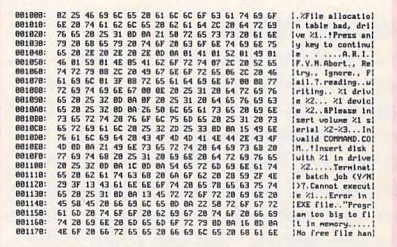
```
C:\DOS>scan
SCAN 1.7Ø49 Copyright 1989 by McAfee Associates.  (4Ø8) 988-3832

To scan an entire disk, just specify which disk you want to scan.
Examples:
          SCAN C:
          SCAN A:

To scan a single directory, specify both the disk and directory.
Examples:
          SCAN C:\newstuff
          SCAN C:\unknown\things
          SCAN A:\

To scan a single file, specify disk, directory, and file.
Examples:
          SCAN C:\unknown\prog.com
          SCAN A:\unknown.exe

To remove infected files, use the /d option.
Example:
          SCAN C:\here /d
```

Detect computer viruses with Viruscan.



```
Fast File & Archive Searcher by Keith Ledbetter          Version 3.1  2Ø-Sep-89

Syntax:  WHEREIS [drivelist:]file.ext [file2... file3...] [-options...]

 -a  = search ARC/PAK/PKA/LZH/ZIP/ZOO files   -p = page break every 24 lines
 -ao = search only arc files                  -h = start in current directory
 -d  = search all logged drives (c: - z:)     -i = ignore environment settings
 -e  = use '*.*' for directory searches       -r = filename on right  of screen
 -g  = goto subdirectory of found file        -m = filename in middle of screen
 -v  = delete found files (with verify)       -y = display European-style dates
 -n  = no verification on deletes             -c = search PATH directories only
 -w  = show wasted space (cluster overhead)   -f = filenames only (for piping)

 -x[filemask]  = exclude these files (may be stacked: ie: -xw.exe -xw.bat)
 -lt[filesize] = only display files smaller than specified size (ie: -lt1Ø24)
 -eq[filesize] = only display files equal to specified size (ie: -eqØ)
 -gt[filesize] = only display files larger than specified (ie: -gt1Ø24)
 -a[num | mm-dd-yy] = only display files since  date (or 'num' days ago)
 -b[num | mm-dd-yy] = only display files before date (or 'num' days ago)
 -arc -pak -pka -lzh -zip -zoo = only search the arc formats specified

Note:  An environment variable named 'whereis' can contain default switches.
       See doc file for an explanation of using this environment variable.
```

Find any file in seconds with Whereis.



```
ØØ1ØØØ: ØZ 25 46 69 6C 65 2Ø 61 6C 6C 6F 63 61 74 69 6F  |.%File allocatio|
ØØ1Ø1Ø: 6E 2Ø 74 61 62 6C 65 2Ø 62 61 64 2C 2Ø 64 72 69  |n table bad, dri|
ØØ1Ø2Ø: 76 65 2Ø 25 31 ØD ØA 21 5Ø 72 65 73 73 2Ø 61 6E  |ve %1..!Press an|
ØØ1Ø3Ø: 79 2Ø 6B 65 79 2Ø 74 6F 2Ø 63 6F 6E 74 69 6E 75  |y key to continu|
ØØ1Ø4Ø: 65 2Ø 2E 2E 2E 2E ØD ØA Ø1 41 Ø1 52 Ø1 49 Ø1     |e . . . ....A.R.I.|
ØØ1Ø5Ø: 46 Ø1 59 Ø1 4E Ø5 41 6Z 6F 72 74 Ø7 2C 2Ø 5Z 65  |F.Y.N.Abort., Re|
ØØ1Ø6Ø: 74 72 79 Ø8 2C 2Ø 49 67 6E 6F 72 65 Ø6 2C 2Ø 46  |try., Ignore., F|
ØØ1Ø7Ø: 61 69 6C Ø1 3F Ø8 72 65 61 64 69 6E 67 Ø8 Ø8 77  |ail.?.reading..w|
ØØ1Ø8Ø: 72 69 74 69 6E 67 Ø8 Ø8 2Ø 25 31 2Ø 64 72 69 76  |riting.. %1 driv|
ØØ1Ø9Ø: 65 2Ø 25 32 ØD ØA ØF 2Ø 25 31 2Ø 64 65 76 69 63  |e %2... %1 devic|
ØØ1ØAØ: 65 2Ø 25 32 ØD ØA 25 5Ø 6C 65 61 73 65 2Ø 69 6E  |e %2..%Please in|
ØØ1ØBØ: 73 65 72 74 2Ø 76 6F 6C 75 6D 65 2Ø 25 31 2Ø 73  |sert volume %1 s|
ØØ1ØCØ: 65 72 69 61 6C 2Ø 25 32 2D 25 33 ØD ØA 15 49 6E  |erial %2-%3...In|
ØØ1ØDØ: 76 61 6C 69 64 2Ø 43 4F 4D 4D 41 4E 44 2E 43 4F  |valid COMMAND.CO|
ØØ1ØEØ: 4D ØD ØA 21 49 6E 73 65 72 74 2Ø 64 69 73 6B 2Ø  |M..!Insert disk |
ØØ1ØFØ: 77 69 74 68 2Ø 25 31 2Ø 69 6E 2Ø 64 72 69 76 65  |with %1 in drive|
ØØ11ØØ: 2Ø 25 32 ØD ØA 1C ØD ØA 54 65 72 6D 69 6E 61 74  | %2.....Terminat|
ØØ111Ø: 65 2Ø 6Z 61 74 63 6Ø 2Ø 6A 6F 6Z 2Ø 2Ø 59 2F 4E  |e batch job (Y/N|
ØØ112Ø: 29 3F 13 43 61 6E 6E 6F 74 2Ø 65 78 65 63 75 74  |)?.Cannot execut|
ØØ113Ø: 65 2Ø 25 31 ØD ØA 13 45 72 72 6F 72 2Ø 69 6E 2Ø  |e %1...Error in |
ØØ114Ø: 45 58 45 2Ø 66 69 6C 65 ØD ØA 2Z 58 72 6F 67 72  |EXE file..*Progr|
ØØ115Ø: 61 6D 2Ø 74 6F 6F 2Ø 6Z 69 67 2Ø 74 6F 2Ø 66 69  |am too big to fi|
ØØ116Ø: 74 2Ø 69 6E 2Ø 6D 65 6D 6F 72 79 ØD Ø6 16 ØD Ø6  |t in memory.....|
ØØ117Ø: 4E 6F 2Ø 66 72 65 65 2Ø 66 69 6C 65 2Ø 68 61 6E  |No free file han|
```

Modify your binary files with HexEdit.

Viruscan's author updates the program whenever a new virus is discovered, so registration will help you keep up to date.

Whereis

If you've ever been frustrated while trying to locate a file on your hard disk, or even on a floppy disk, Keith Ledbetter from Virginia has the answer. His program, *Whereis*, can find any file in seconds.

Like DOS's DIR command, *Whereis* runs from the command line. You control the program with an extensive collection of switches. You can tell the program to search for files with a specific range of dates or file sizes, pause when the screen is full, and even have *Whereis* ask you whether you want to delete each file as it's found.

That's not all. *Whereis* can search for your files inside archived files. It supports all the current archiving formats from ARC to ZIP. Another switch lets you change automatically to the directory containing the file you're searching for. The program can also use DOS wildcard characters on its command line.

Giving the command WHEREIS by itself displays a list of switches. If you commonly use the same set of switches, you can use DOS's SET statement to create an environmental variable to control *Whereis*.

This program will run on any IBM-compatible that uses DOS 2.1 or higher. The author doesn't require a registration fee but does request a contribution if you enjoy his program.

HexEdit

Editing the typical text file is simple. You just load the file into a word processor or text editor and make the necessary changes. But try loading a COM or EXE file, and your editor will choke on the file—if it can load it at all. Other binary files, such as database, spreadsheet, and graphics files cause the same problem.

To work with binary files, you need a special type of editor. Oklahoma programmer Richard Morris saw the need and produced *HexEdit*, one of the best binary file editors available anywhere.

You can use *HexEdit* to make minor changes in program files, especially to correct spelling errors. Here at *COMPUTE!'s PC Magazine*, we use it frequently for just that purpose. Programmers will find it useful for the same reason, as it can eliminate the need to recompile a program just to correct a simple mistake.

You can also use the program to repair corrupted database or spreadsheet files. *HexEdit* is ideal for searching program files for warnings that the program may be dangerous. Trojan horse programs and viruses often contain messages like *Gotcha!* or *Now trashing hard disk data!*. *HexEdit* is also a good educational tool, letting you look at files you normally couldn't see.

Once you load a file into the program, you can edit either hexadecimal characters or normal ASCII characters. Unlike most other binary editors, *HexEdit* offers search-and-replace commands, includes block-manipulation tools, and can even add characters to a binary file. Press Alt-H to see a list of commands.

HexEdit is a powerful program, so you need to use it with caution. Read the documentation file, HEXEDIT.DOC, carefully before using the program. When you edit any file, be sure to work *only* with a copy of the file—*never* with the original. If you change a COM or EXE program file, alterations made in its size or to any characters other than simple text may cause the program to crash.

Used properly, *HexEdit* offers unmatched power for the experienced user. It's even possible to change the names of internal DOS commands, like DIR or TYPE, by editing COMMAND.COM. Altering COMMAND.COM, however, is especially dangerous, and a fresh copy of the original should always be on hand.

HexEdit uses as little as 256K of memory, requires DOS 2.1 or higher, and can run on any monitor. The program's author requests a $10 registration fee for this shareware program.

Virus Update

Most of you remember last October's big virus scare. The news was full of warnings about viruses that were supposed to attack IBM-compatible computers across the country. The risk made great headlines, but, as we all found out, the threat was minimal. Only a few computers in Europe suffered any damage from the so-called Columbus Day Virus or the Jerusalem Virus which was supposed to strike on Friday, October 13.

As I've said several times in this column, the threat of viruses is exaggerated by the national media. Users who obtain shareware software from reliable sources, such as *COMPUTE!'s PC Magazine*, mail-order shareware distributors, or good online services and BBSs, run little risk of infection.

That's not to say that there's no risk. There are real viruses out there, and your system could be infected. Frequent backups are important, protecting you not only from viruses but from hard disk crashes, as well.

Software protection is also important. We've found an exciting new antivirus program, *Viruscan*, and have included it on this issue's disk. See "This Issue's Programs" for complete details.

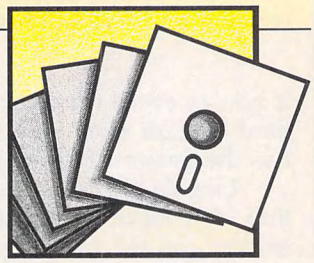
Shareware News

Quicksoft, the publisher of *PC-Write*, has released version 3.03 of that powerful word processor. New features include better printer support, improved spelling checking, and better editing features. If you use an earlier version, contact Quicksoft about an upgrade.

Quicksoft's new product, *PC-Write Lite*, offers many of the features of *PC-Write*, but with less complexity. If you don't need a maximum-strength word processing program, *PC-Write Lite* could be ideal for you. Quicksoft can be reached at 219 First Avenue North, Seattle, Washington 98109. Or you can phone the company at (206) 282-0542.

Users of *Microsoft Windows* should definitely take a close look at *Command Post* from Wilson WindowWare. This $20 shareware program acts as a shell for *Windows*, offering customized menus, file management, screen blanking, and other features to make using *Windows* easier. You'll find this program on CompuServe and GEnie under the filenames CP-62B.ZIP or CP-62B.ARC. You can contact Wilson WindowWare at 3377 59th Street Southwest, Seattle, Washington 98116. The company's phone number is (206) 937-9335. For just $5.00, you can receive a disk containing the shareware version. PC

PC DISK UPDATE



How to Get the Most from Your PC Disk

Joyce Sides

This issue's installment of *COMPUTE!'s Menu Operating System (CMOS)* has some new features. Now you can run most of the programs from the disk without uncompressing them. If a program runs from *CMOS*, the Run option appears when you select the program. If you have less than 384K of memory, however, you'll have to install the programs from the menu and run them from DOS.

We've also replaced the menu's Uncompress option with Install. The new option installs files on your hard disk or floppy and automatically uncompresses them, if necessary.

Directory Assistance

Here are a few tips to make installing and running programs easier.

Read the documentation files before attempting to run the programs. It's a good idea to write down the commands to run the programs or print the DOC files before you exit *CMOS*.

After you've read the DOC files and installed the programs, exit *CMOS* and switch to the hard drive. Type CD *directory* or CD \COMPUTE \MAR90 if you chose the default directory when you installed the programs for this issue's disk.

Enter the command to run one of the programs. If you encounter the message *Bad command or filename,* make sure you entered the command correctly and that you're in the right directory.

Genius Mouse vs. *Volleyball*

If your computer locks up when you run *Arcade Volleyball* (March 1989) and you use a Genius mouse, you should take an extra step when booting your system. Hold down the mouse buttons as the system boots and watch for a message about Microsoft compatibility. *Arcade Volleyball* should work once your mouse is set in Microsoft-compatible mode.

Moving Margins Continued

Last month I discussed inserting left margins to print the DOC files on the PC disks by changing the DIP switches on your printer or using a word processor. This month let's look at how to print DOC files with left margins using BASIC or a batch file.

You can enter a single command in BASIC to change your printer's margins. There are a lot of different printers, and they all accept special printer codes. Following are some common printers and the printer codes that allow you to change the left margin. If none of these works with your printer, check your printer manual for the correct codes.

Epson RX-80
CHR$(27);CHR$(108);CHR$(n)

Tandy DMP130A
CHR$(27);CHR$(81);CHR$(n)

Star Micronics SD10/15
CHR$(27);CHR$(108);CHR$(n)

To load your BASIC interpreter, enter BASICA or GWBASIC at the A> prompt with your DOS system disk in drive A. If you load BASIC correctly, the Ok prompt appears. To avoid running BASIC every time you want to change your printer's margins, create a BASIC program that sends the codes to your printer and returns to the DOS prompt. Here's a sample BASIC program to change the Tandy printer's left margin to 5:

```
10 LPRINT CHR$(27);CHR$(81);CHR$(5)
20 SYSTEM
```

Save the file by typing SAVE"*filename*" at the Ok prompt. If you own a floppy-based system, save the program to a disk that contains your BASIC interpreter. Then insert that disk in drive A and enter BASIC *filename* or GWBASIC *filename* depending on the name of your BASIC interpreter. Make sure your printer is online before running the program.

If you'd rather stick with DOS, you can create an ASCII file that contains the necessary codes and send them to the printer via a batch file. I use EDLIN to enter the codes instead of a word processor. You can use any text editor such as *Sled* (January 1989) to enter the codes in your file. It's best to use a text editor, because some word processors don't save the escape sequences correctly.

EDLIN should be located on your original DOS disk. See your DOS manual for instructions on how to enter text in EDLIN. Pay special attention to the instructions on entering escape-code sequences. To enter numbers, use the numeric keypad, not the numbers at the top of the keyboard.

The sequence to change the printer to IBM mode and set the left margin at column 5 is Esc 58 Esc 81 5. Check your printer's manual to make sure these are the correct codes for your printer. The sequence suggested here works on a Tandy DMP130A printer with DIP switch 1 set in the off position.

Save your file with the filename PRNCODES. Create a separate file called PRNRESET to reset your printer to its default settings. Some printers use the top-of-form code to reset the printer.

Enter the following lines in a file called LM.BAT to send the codes to the printer, print a DOC file, and return the printer to its default settings.

```
COPY PRNCODES PRN
COPY %1 PRN
COPY PRNRESET PRN
```

Make sure you turn your printer off and back on to clear any previous codes before sending the new codes to the printer. Copy the batch file and the two printer-code files to a directory listed in the PATH statement in your AUTOEXEC.BAT file. Enter LM *filename* to run the batch file. The filename should be the name of the DOC file you want to print. PC

HOW TO USE THE DISK

Every issue of *COMPUTE!'s PC Magazine* includes a 5¼- or 3½-inch disk. If you have a problem with the disk, contact us at (919) 275-9809 between 9:00 a.m. and 4:30 p.m. EST, Monday through Friday.

Before you begin using the magazine disk, we highly recommend that you make a backup copy and keep the original in a safe place. If possible, use the DISKCOPY command to make your backup copy. Some files on the disk may be located in subdirectories, and the COPY command won't copy all the files in a subdirectory unless you specify the path.

If you have one floppy disk drive, put your DOS disk into the drive and enter DISKCOPY. Then follow the onscreen prompts.

If you have two floppy disk drives, put your working copy of DOS into drive A and enter DISKCOPY A: B: at the DOS prompt. When DOS prompts you, remove the DOS disk from drive A and replace it with the magazine disk. Put a blank disk into drive B and press any key.

Running the Menu

Descriptions of all the programs on the disk are contained in *COMPUTE!'s Menu Operating System (CMOS).* You can run the menu by entering MENU at the DOS prompt. If you have a Microsoft or compatible mouse, it's automatically detected by the program.

Before running the disk programs, follow the instructions in the magazine articles or in the documentation files included with the programs. Remember that some files on the magazine disk are not executable programs; for instance, some files may contain only the data for a program.

The entry highlighted when the menu boots is Information and Extras. If you select this option, another menu appears with additional programs or information about the magazine. You can print a subscription form for *COMPUTE!'s PC Magazine* (choose About COMPUTE!'s PC Magazine), print a monthly disk survey form, or print the disk contents.

To get started with the menu, highlight a program name with the cursor or move the mouse pointer and click the left button. A description of the program appears in the box at the bottom of the screen. To select a program, press Enter or click the left mouse button. To go back to the previous screen, press the Esc key or click the right mouse button. Once you've selected a program, a list of options appears at the top of the screen and the requirements for running the program appear in the box located in the upper right corner of the screen.

If a program runs from *CMOS,* that option is offered when the program is selected. If Run isn't an option, the program must be run from DOS. First read or print the documentation file; then install the program. Exit the menu and run the program, following the instructions in the documentation file or the accompanying magazine article.

Tips

▶ Be sure that your graphics system (Hercules, CGA, or EGA) matches the program requirements.

▶ Don't be concerned that your PC disk might have a virus. We get a disk with the latest version of each program directly from the author, and we run a battery of tests on each file to ensure that it's virus-free.

▶ Before running a program that you've installed from the menu, be sure to change to the correct drive and directory.

▶ If you can't display a directory of the disk with the DIR command, the disk is probably defective. Return your disk to us, and we'll quickly send you a replacement.

Installing Programs

Before you can run a program from your hard disk or another floppy disk, you must install it. To install a program, highlight the program's name and press Enter or click the left mouse button. Follow the prompts to continue installation or press the Esc key to return to the previous menu or screen.

You can install the files to your hard drive or a floppy disk. If you choose the defaults, the files install to C:\COMPUTE*monthyear*\ on your hard drive or the root directory of your floppy disk. The default directory for each disk reflects the month and year of the issue of the magazine.

To edit the default directory, use the backspace key and the cursor keys. Enter the complete pathname to the directory where you want to install the files. If the directory doesn't exist, it will be created for you.

Once the files are installed, they're ready to run. If you installed the files to your hard drive, exit the menu and use the CD command to change to the directory where the program files are located.

TurboTYPE

COMPUTE!'s Menu Operating System uses *TurboTYPE* (T.EXE) to read documentation files on the PC disk (the menu contains special routines that temporarily uncompress DOC files to your PC's memory where *TurboTYPE* reads them). But you can use *TurboTYPE* as a stand-alone replacement for DOS's TYPE command to read any ASCII text file. Simply type T *filename* at the DOS prompt. We always put the latest version of *TurboTYPE* on each disk, so if you're using an earlier version, you can upgrade. For more information on *TurboTYPE,* see the July 1989 issue of *COMPUTE!'s PC Magazine.*

Programs That Require DOS

Some programs on PCs and compatibles require COMMAND.COM (a DOS file) to operate. Floppy drive systems look for COMMAND.COM on drive A, so it's best to keep a disk with COMMAND.COM in drive A.

If there's room on the disks that contain the working copies of the programs, you can copy COMMAND .COM onto them. If there isn't room, put a COMMAND.COM disk in drive A and the copy of the program disk in drive B. Then run the program from drive B.

If the system you're using boots from a hard drive, the computer can find COMMAND.COM on the hard drive. If you boot a hard drive system from a floppy disk in drive A, you should keep a COMMAND.COM disk in drive A.

With the exception of the featured programs in our "Best of the Boards" column, the entire contents of COMPUTE!'s PC Magazine *and the disk are copyright 1989 by COMPUTE! Publications, Inc., all rights reserved. The programs are intended for use by the purchaser of the magazine and may not be distributed to others in any form. We ask that you respect the copyright.* PC

ExpressWriter 311

Peter Scisco

Printers and I enjoy an uneasy alliance.

As a writer, I count on them to produce readable copy dependably, quickly, and with a minimum of fuss and bother. When I worked as a freelancer, those qualities often meant the difference between a successful assignment and a strained bank balance. Any small-business owner—including those working from home—can identify with that.

Express Lane

The Toshiba ExpressWriter 311 fits the bill nicely as a home or small-business printer. This 24-pin printer is small (approximately 17 × 12½ × 6 inches), so it won't swamp your desk, and it's light (about 11 pounds), so you can take it with you on the road. The printer's built-in carrying handle and storage compartment (for the power cord and a short parallel cable) enhance its portability.

I've seen my share of printer quirks, but the ExpressWriter 311 appears free of any major flaws. The ribbon snaps into place easily, which makes replacement quick. Loading single sheets is easier than on many other printers: Simply set the sheet in the paper guide, pull forward on the paper-bail lever, and the sheet feeds through smoothly to the top of the form, ready to go.

I printed several documents on letterhead and plain paper (using *XyWrite III+*, *WordPerfect*, *Works*, and *Grandview*) and experienced no problems with my top margins on the first or subsequent pages. I wish I had a nickel for every minute I've wasted on other printers that have trouble with such simple jobs.

Continuous paper worked just as well, although I had some difficulty loading the paper at the beginning. The mechanism that's supposed to grab the first sheet and pull it through didn't want to operate, so I used the Feed switch. That worked fine and the printer initialized at the top of the form without any trouble.

The traditional printer controls are located on the top front panel and consist of four touch-sensitive controls (there are no buttons to mar the printer's sleek design). Included among the controls are Select (for on- or offline selection), Feed (one button controls both the linefeed and form feed), Quiet (for switching to quiet mode), and a Pitch/Font switch that toggles through the various point sizes (10–12 characters per inch), condensed printing, and draft-quality or near-letter-quality printing.

Quiet, Please

The controls worked well and were easily managed. My only criticism is that the Quiet switch seemed an afterthought. To make the printing quieter, the ExpressWriter makes two light passes instead of one regular-strength pass. I can't believe that the printhead is striking the paper so lightly during the double pass that it makes any appreciable difference in the noise level. Perhaps it measures differently on a sound engineer's decibel meter, but to my ears the printer made the same annoying screech you associate with other dot-matrix printers.

The ExpressWriter bills itself as three printers in one package: a high-speed draft-mode printer (180 characters per second at 12 characters per inch), a letter-quality printer for formal documents (60 cps at 12 cpi), and a graphics printer. The print quality is uniform and, within the printer's limitations, quite acceptable. The letter-quality print was very readable, and the draft quality maintained good form as well. I printed a page of graphics from *DeluxePaint*, and the results were adequate. This isn't a printer for illustrators or desktop publishers (and it doesn't pretend to be), but it's quite capable of printing small graphics elements to enhance professional correspondence—charts, graphs, illustrative clip art, and the like.

Because it emulates IBM Proprinter and Epson LQ printers, the ExpressWriter enjoys support from the majority of software programs. But its main advantage over other printers in this class is its font capability. Besides the three resident fonts, you can download fonts from disk or use the 311's font cards. Each font card is about the size of a credit card and fits into a slot on the left side of the printer.

The ExpressWriter 311 includes font cards.

The Big Dipper

By setting the DIP switches (easily reached at the front of the printer beneath the protective cover) and issuing commands from your word processor (the manual gives instructions for *MultiMate*, *Advantage*, *WordPerfect* versions 4.1 and 4.2, *WordStar*, *Word*, as well as instructions for configuring *Lotus 1-2-3*), you can take advantage of a wide array of typefaces and type styles to bring added punch to your documents.

Besides the font cards, the ExpressWriter can also use 32K memory cards, which boost its capacity for downloadable fonts and provide a print buffer (the default buffer can range from 4K to 16K). I wasn't able to test the printer with a memory card, but users who are interested in downloading fonts will especially appreciate the memory-card option.

Toshiba's manual, in keeping with the 311's low profile, is small but informative. All you need to know about DIP-switch settings, paper loading, maintenance, and sundry other printing tasks is included in the book's pages. The index is small but serviceable, and, in a nice touch, there's a glossary of printing terms that gives the novice, as well as the

FAST FACTS

Title:	ExpressWriter 311
Category:	24-pin dot-matrix printer
Features:	Letter-quality printing; font cards; memory-card expansion; IBM, Epson, and Qume printer emulation
Manufacturer:	Toshiba America Information Systems Division 9740 Irvine Blvd. Irvine, CA 92718
Price:	$589; memory card $99; font cards $79

intermediate user, a handy reference. For especially taxing problems, the manual includes technical-support addresses along with the phone number for a toll-free hotline.

All in all, the ExpressWriter 311 offers the home or small business a versatile, trouble-free printer for letters, short documents (less than book length), and proposals that require basic graphics and type design. If you're looking for a solid 24-pin performer, the 311 might be just your type.

QuiteWrite

Mickey McLean

QuiteWrite may be the economy car of word processors, but that doesn't mean it lacks all the important features of the bigger, sleeker models. I wouldn't recommend using it to write your next novel, but it will work just fine for letters, memos, and school papers. It's a good, inexpensive introduction to the world of word processing.

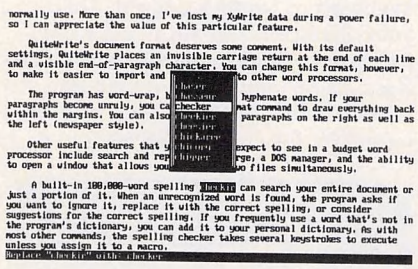
QuiteWrite's screen is simplicity itself. The only adornment is a ruler bar across the bottom of the screen that indicates margin and cursor locations (and even this can be cleared away, leaving the entire screen for your words). When you press the escape key, the ruler disappears and is replaced with the command menu.

Today's Menu

For the novice, the program conveniently prompts you through almost every step. For example, if you open a file and can't remember the filename, you can press Enter and see a list of saved documents. Then you can move the cursor down, highlight the correct filename, and call it to the screen.

QuiteWrite uses a series of menus to execute commands. This makes navigating the program easy for novices, but it will slow down experienced users. Parsons Technology should consider adding simple keystroke commands to future versions.

You can, however, eliminate menus for the ten most common commands. *QuiteWrite* lets you create ten macros that represent either commands or commonly used words and assign them to function keys. You can create macros especially for the file you're currently working on and save them to that file for future use, or you can save them to the setup file for use with all your files.


normally use. More than once, I've lost my XyWrite data during a power failure,
so I can appreciate the value of this particular feature.
QuiteWrite's document format deserves some comment. With its default
settings, QuiteWrite places an invisible carriage return at the end of each line
and a visible end-of-paragraph character. You can change this format, however,
to make it easier to import and
to other word processors.
The program has word-wrap,
hyphenate words. If your
paragraphs become unruly, you ca
mat command to draw everything back
within the margins. You can also
paragraphs on the right as well as
the left (newspaper style).
Other useful features that y
expect to see in a budget word
processor include search and rep
rge, a DOS manager, and the ability
to open a window that allows you
o files simultaneously.
A built-in 100,000-word spelling checkr can search your entire document or
just a portion of it. When an unrecognized word is found, the program asks if
you want to ignore it, replace it with the correct spelling, or consider
suggestions for the correct spelling. If you frequently use a word that's not in
the program's dictionary, you can add it to your personal dictionary. As with
most other commands, the spelling checker takes several keystrokes to execute
unless you assign it to a macro.
Replace "checkr" with: checker
thesaurus
checker
checkers
chickaree
chicory
chipper

QuiteWrite *includes a spelling checker.*

You can also change the default settings for most formatting commands such as margins and tabs and save your preferred screen display. The program remembers your last command and can be programmed to repeat commands.

Savings Account

One of *QuiteWrite*'s most useful features is its autosave command. You tell the program to save your file after any set number of seconds, and *QuiteWrite* does the rest.

I wish this feature were available on *XyWrite*, the word processor that I normally use. More than once, I've lost my *XyWrite* data during a power failure, so I can appreciate the value of this particular feature.

QuiteWrite's document format deserves some comment. With its default settings, *QuiteWrite* places an invisible carriage return at the end of each line and a visible character at the end of each paragraph. You can change this format, however, to make it easier to import and export files to other word processors.

The program has word-wrap, but it doesn't hyphenate words. If your paragraphs become unruly, you can use the format command to draw everything back within the margins. You can also justify your paragraphs on the right as well as the left (newspaper style).

Other useful features that you might not expect to see in a budget word processor include search and replace, mail merge, a DOS manager, and the ability to open a window that allows you to work on two files simultaneously.

A built-in 100,000-word spelling checker can search your entire document or just a portion of it. When an unrecognized word is found, the program asks if you want to ignore it, replace it with the correct spelling, or consider suggestions for the correct spelling. If you frequently use a word that's not in the program's dictionary, you can add it to your personal dictionary. As with most other commands, the spelling checker takes several keystrokes to execute unless you assign it to a macro.

Good Driver

QuiteWrite offers a choice of 44 printer drivers, including specialized Hewlett-Packard LaserJet files that allow landscape (horizontal) printing and additional fonts. You can customize the printer file by setting up printer codes for type-style mode changes and character substitutions. You can use custom fonts, too.

The program's documentation is short and to the point. Simple examples are provided for almost every command and function. You can bring up help at any time, and specific help appears on the screen when you move through the different levels of menus. There's also a tutorial on the program disk.

With *QuiteWrite*, you can't work efficiently with large files, open nine windows at a time, or perform fancy editing tricks. But you can easily write short documents, work on two documents at the same time, use mail merge to write form letters and print

FAST FACTS

Title:	*QuiteWrite*
Category:	Word processor
Features:	Pop-up menus; online help; word-wrap; autosave; search and replace; macros; mail merge; DOS manager; windows
Requirements:	IBM, Tandy, or compatible PC; 192K; DOS 2.0 or higher
Publisher:	Parsons Technology Dept. COM 375 Collins Rd. NE Cedar Rapids, IA 52402
Price:	$29

mailing labels, and use macros to simplify your tasks. As the saying goes, you get what you pay for; in this case, you get much more.

Omnicron Conspiracy

Keith Ferrell

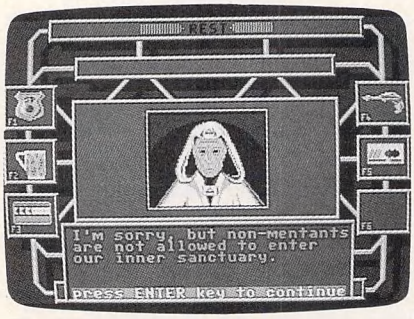
There were moments—years, actually—when it looked as though *Omnicron Conspiracy* might never appear. Enthusiastically touted by Epyx during its early phases of development, the program promised to be one of the most ambitious and serious science-fiction games ever produced for the PC.

Then came the great silence.

In its final incarnation, *Omnicron Conspiracy* is a gorgeous, witty interstellar adventure that is admirably complex, yet it falls a bit short of its original goals.

The scenario is still clever: You're an interstellar agent assigned to break up a drug-smuggling ring. This is an old and honored space-opera plot, with antecedents going back at least as far as E. E. Smith's Lensman series. And, in the best tradition of space opera, *Omnicron Conspiracy* contains more than one mystery and more than one level of complication.

Solving the mysteries requires skill and concentration. You must visit planets, explore cities, prowl through libraries, and search for clues. A streamlined interface relies on simple keyboard or joystick control. Guide your character through various environments using as many as six tools—laser, badge, and so on—that are stored in the agent's pockets and accessed by the function keys.



Can you solve the Omnicron conspiracy?

Your interaction with other characters is equally simple, perhaps too simple. Conversation is decidedly one-way, with characters making offers—some of them salacious—which you can accept or refuse via menu bars.

The settings are well depicted, especially the planet Cron. In Cron's streets, you'll encounter aliens, robots, and the local color in multiple hues. This is an animated world. As you walk, creatures hop and fly by, doors beckon to be entered, and signs demand to be read. There are bars, apartments, and buildings, many of which you can explore. Exploration can be dangerous and wearying; both your energy level and health have graphic representations that you'll need to monitor.

For the most part, this is a good game, set in a rich and well-realized universe that's fun to knock around in.

Omnicron Conspiracy's effectiveness, though, is tempered by its tendency to go for the cheap joke. Self-conscious and smarmy humor mutes the mystery at the heart of the program. (For example, there's an encounter with a hooker that promises more than is delivered.) *This is just a computer game,* the jokes seem to say, *nothing you should take very seriously.*

That's probably good advice—software, after all, isn't literature yet. But if interactive entertainment is to grow toward the sort of experience that the original plan for *Omnicron Conspiracy* promised, designers and publishers will need to learn to trust their material and their audiences. A *serious* science-fiction adventure, for example, is more than possible using *Omnicron*'s engine.

I hope Epyx will take its tongue out of its cheek and revisit this territory. The rewards will be worth it.

FAST FACTS

Title:	*Omnicron Conspiracy*
Category:	Graphics-based science-fiction adventure game
Features:	Variety of interactive scenes, locations, and characters; easy-to-use interface; health and energy-level indicators
Requirements:	IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; any graphics adapter (CGA, EGA, MCGA, and Hercules supported)
Publisher:	Epyx 600 Galveston Rd. Redwood City, CA 94063
Price:	$49.95

Silpheed

Ervin Bobo

Silpheed takes the excitement of *Space Invaders,* adds a double dose of 3-D graphics, throws in 20 levels of play, and plugs it all into your PC.

The game's fanciful opening graphics introduce you to your Silpheed fighter and your enemies' spacecraft. You see rotating 3-D wireframe graphics and information culled from some future database. The end includes a beautiful rendering of a setting planet and crawling credits that emulate a Hollywood movie.

In between, you'll find yourself at work in a familiar starry void, battling hordes of diving and darting enemies in a space war reminiscent of the arcade game *Galaga.*

In *Silpheed,* different enemies have different strengths, and not all can be killed by your weapons. Avoid

FAST FACTS

Title:	*Silpheed*
Category:	Spaceship arcade game
Features:	Variety of enemy spaceships; 20 levels of play
Requirements:	IBM, Tandy, or compatible PC; 512K; CGA, EGA, VGA, or Tandy 16-color graphics adapter; joystick optional; Ad Lib sound board, IBM music card, and Roland MT-32 music card supported
Publisher:	Sierra P.O. Box 495 Coarsegold, CA 93614
Price:	$34.95

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- ☐ **The DOS Learning System (1417)** – Learn how to use DOS with this great tutorial. All versions of DOS 2.0-3.3.
- ☐ **Funnels and Buckets (1727)** – A fun way to teach children basic math skills! (CGA)
- ☐ **Lotus Learning System (2 disks) (1420)** – Learn Lotus 2.0 easily and quickly.
- ☐ **Play 'n' Learn 2.03 (1735)** – A collection of six programs for children 18 months to 4 years. (CGA)
- ☐ **Typing Teacher (1425)** – This disk contains 3 program designed to improve the speed and accuracy of your typing!
- ☐ **World 2.93 (1849)** – The ultimate globe! Learn about cities, countries with this computerized globe. (CGA)

GAMES

- ☐ **Arcade Games 1 (1811)** – Pac-man (3 versions!), Hopper, Space Invaders, Janitor Joe and others. (CGA)
- ☐ **Arcade Games 2 (1812)** – Q-Bert, Donkey Kong, Breakout, Beast and others. (CGA)
- ☐ **Arcade Games 3 (1813)** – Striker, Space War & more. (CGA)
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- ☐ **EGA Cunning Football 2.3 (1927)** – The best football simulation anywhere. EGA or VGA Graphics required.
- ☐ **EGA Games 1 (1911)** – A collection of the best EGA games including EGAroids, Reflex, Aldo, Flees and others. EGA or VGA Graphics required.
- ☐ **Graphic-Less Games (2111)** – A collection of games that don't require color or graphics. (Will work on ANY system!)
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- ☐ **Mind Puzzles (2439)** – 3 programs that challenge the mind! (CGA)
- ☐ **Miramar Flight Simulator (2319)** – Go to Top Gun flight school and pilot an F-18 into combat. (CGA)
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- ☐ **Formgen 3.31 (3227)** – A very versatile form generator. Make any kind of form for business or home on any printer!
- ☐ **Kwikstat 2.0 (2 disks) (3130)** – A complete, easy-to-use statistics package.
- ☐ **PC-Key-Draw 3.65 (4 disks) (2780)** – An exceptionally powerful graphics program. Comes with a large collection of ready-made graphics. (CGA) (HD)
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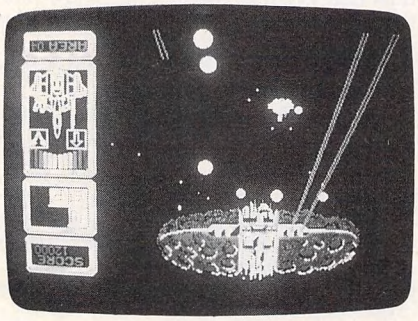
them if you can by moving your ship up, down, left, or right. To destroy them, you'll have to wait for a descending *W* and ram it to increase your ship's destructive power.

Other letters, when shot, speed up the game, give you additional shielding, put protective asteroids around your ship, and so on. Unlike its antecedents, *Silpheed* doesn't allow your quick destruction: The enemy will take you apart one piece at a time. First, your shields will go, then your weapons, then your engine, and finally you.



It's fast-paced action with Silpheed.

Help is at hand—sometimes—in the form of an *R* for repair, but you may go a long while without seeing one.

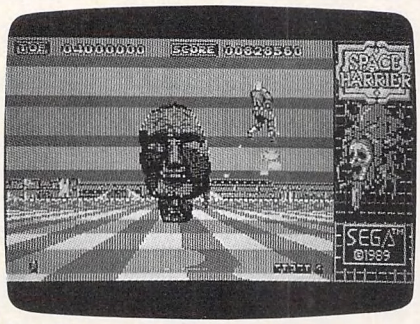
With 20 levels of play in different settings, a variety of enemies, and the chance to increase your firepower through point accumulation, *Silpheed* should satisfy anyone who has spent the last few years complaining about the lack of a really good shoot-'em-up arcade game for the PC.

Space Harrier

Richard Sheffield

A horde of ghastly creatures has descended onto a beautiful world from all the corners of the galaxy. Armed only with your laser blaster and a levitation belt, it's your job to rid the planet of the alien invaders.

That's *Space Harrier*, and much of it will be familiar to arcade fans. One notable exception is that you're moving into the screen as opposed to viewing the game from the traditional top-down view. This presents the programmers with some interesting perspective problems. For the most part, they've done a good job. The only problem I had was with the obstacles. Even in EGA, it's hard to see what's in the distance, giving you little time to react and move out of the way.



Destroy nasty creatures in Space Harrier.

The obstacles *are* a good game feature, however. When they're combined with your forward speed, they can be quite deadly. You'll repeatedly experience the explosion on impact, screams of agony, and crumpled bodies as you learn your way. I like the fact that you're forced to maneuver around many of the obstacles while you're trying to bag the bad guys. This is especially challenging at the higher levels where they can't simply be blasted out of your way.

Hello Again

Death comes quickly to your character in this game, but Sega makes it a little easier by giving you four lives and four attempts for each life. After that, the game ends and you're forced to restart at the beginning.

Each level is topped off by a very nasty beast. It may take a dozen or so blasts to bring it down, and all the while it's fighting back. Fortunately, there's usually a pattern to the creature's evil that you can exploit—if you live long enough to figure it out, that is.

You can use either a joystick or a mouse. While the mouse seemed to provide a quicker response, I found that I preferred the accuracy and precision of the joystick.

I found *Space Harrier* to be less addicting than other games in this category. Perhaps I just don't have the tenacity or the reflexes of the average teenager any longer.

While the EGA graphics may not rival the coin-op version, they certainly provide an interesting and ever-changing backdrop for the action. And the action is nonstop, offering enough variety and challenge to keep even advanced-level players busy for quite a while.

FAST FACTS

Title:	*Space Harrier*
Category:	Spaceship arcade game
Features:	Multiple levels; moving-into-the-screen perspective
Requirements:	IBM, Tandy, or compatible PC; 640K; graphics adapter; 8-MHz or faster computer recommended
Publisher:	Sega Distributed by Mindscape 3444 Dundee Rd. Northbrook, IL 60062
Price:	$39.95

Star Goose

Tom Netsel

An unemployed star fighter named Goose meets a curvaceous beauty in a sleazy space bar. He's lost his ship, and he wants another. She has one power crystal from the planet NOM, but she wants more. They strike a bargain.

In the scenario that sets up this arcade game from Spinnaker, Goose plans to gather the power crystals that are scattered about on the rolling landscape of NOM in exchange for a new ship. The crystals are there for the taking, but there are a few obstacles, namely machine-gun nests, laser pill boxes, and robotic attack vehicles. That shouldn't deter Goose, for the mysterious woman has provided him with a new top-secret fighter packed to the hilt with the latest weapons—the Star Goose.

Be prepared for an exciting ride as your ship crawls across eight levels of undulating 3-D scenery, backed up by a jaunty but optional musical score. Use your mouse or definable keyboard keys to steer, brake, or accelerate as you search for the multicolored crys-

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Note:

- *Selected titles are listed under contents for each issue*
- *3½-inch disks available for some issues*
- *Programs requiring more than 256K or a color monitor are so noted*

March 1988, Issue 4, Vol. 2, No. 2

Feature

Flying Home: *Flight Simulator* adventure

Software on Disk

TheDraw: Design custom menu screens, presentations, or animated sequences
Tonto!: Pop-up with ASCII chart, clock/calendar, directory, hex converter, keyboard scan code reader, and printer setup
Font Typesetter: New fonts for your printer (CGA)
Designing Custom Fonts: Create your own fonts for Font Typesetter (CGA)
FileFinder: Locate any file, in any directory
SuperTiler: More power for BASIC's PAINT (CGA)
Hover: Futuristic tennis game (CGA)
DOS Help: Help screens for DOS commands

May 1988, Issue 5, Vol. 2, No. 3

Feature

Advanced Spreadsheets: Special techniques for power tools

Software on Disk

Quick Scheduler: Organize yourself!
Source Code XREF: Debugging made easy
Text File Compare: Find out which file is which
WHOA!: Control your PC's speed (EGA not supported)
Las Vegas Solitaire: Solitaire with casino rules
States & Capitals: Learn U.S. geography and have some fun (CGA)
QikServe: Arcade fun in a fast-food setting (CGA)

July 1988, Issue 6, Vol. 2, No. 4

Features

How to Build Your Own PC Clone: Expert advice on a money-saving alternative
In Praise of PC Play: PC blasts into the game market
Talking to Your Printer: Make your printer do all its tricks
Buyer's Guide to Simulation Software: 38 exciting games put you in command

Software on Disk

JLSCAN: Super file lister
Presentation Graphics: Create professional-looking graphs and charts (CGA)
File-It: Save text screens to disk
Graphics Shape Editor: Design your own graphics for games (CGA)
Ancient Empires: The glory of battles past (CGA)
Power Poker: An old favorite with a new twist

January 1989, Issue 9, Vol. 3, No. 1

Features

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September 1989, Issue 13, Vol. 3, No. 5

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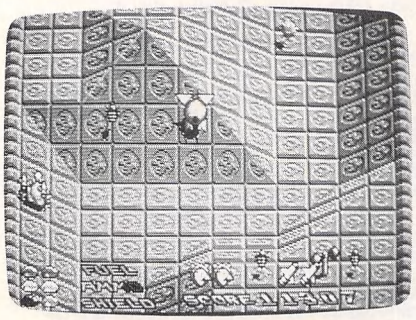
FOR ORDER INFORMATION AND FORM, SEE PAGE 73.

tals. Take your time though, as you blast, plow through, or sidestep obstacles. Remember, you're piloting a goose on the planet's surface, not flying over it in a star cruiser.



Look for power crystals in your Star Goose.

Inertia comes cleverly into play when you're loaded with armed missiles. They're heavy, and your ship handles accordingly as you dip and swerve across the terrain or climb tunnel walls. Your score keeps increasing as long as your four lives last, so stay alive, collect crystals, and earn points. There's no clock to race. Your score, status, number of crystals collected, and number of lives remaining are displayed at the bottom of the screen.

When you notice your fuel, ammunition, or shield power running low, you can replenish them by entering the appropriately marked tunnels and colliding with the strange floating eyes that drift by. You have plenty of machine-gun ammo, but your missiles are the only weapons powerful enough to take out the heavily armored targets. Your missile supply is limited, but you can locate and pass through a missile gate to restock. Simply drive over a crystal to pick it up.

FAST FACTS

Title:	*Star Goose*
Category:	Space action game
Features:	3-D relief landscape; vertical and variable-speed scrolling
Requirements:	IBM, Tandy, or compatible PC; 384K (512K for EGA)
Publisher:	Spinnaker Software One Kendall Sq. Cambridge, MA 02139
Price:	$39.95 (5¼-inch disks); $44.95 (3½-inch disks)

Collect six crystals on one level and you advance to the next.

Be careful when you enter a new level. Check out its defenses and locate a path to an exit tunnel. If you plow through with guns blazing, you'll probably be caught in a deadly cross fire or be run off the planet's surface. In any event, you'll waste a life and learn little about how to safely negotiate the terrain.

The top scores are saved to disk, and you don't necessarily have to start at level 1 every time a game ends. That's a nice touch.

It should be noted that there seems to be some confusion about the game's name. According to the mysterious beauty and the name on the box, it's *STARGOOSE*—one word, all capital letters. But in the 8½ × 11 inch sheet of instructions, it's referred to as *StarGoose!*, *Star Goose!*, and *Star Goose* (without the exclamation point). *Star Goose!* appears on the game's title screen, but, on the score screen, it's the plural *Star Geese!*.

Whatever you call it, I enjoyed playing this smooth-scrolling arcade game. *Star Goose* is no turkey.

Turbo EMS

Robert Bixby

In my hour of need, *Turbo EMS* saved the day—so don't expect an unbiased or balanced review.

Here's the story: I had to run *Adobe Illustrator*. It requires expanded memory, and I couldn't find expanded memory anywhere. Would I actually have to *buy* some EMS? Maybe take out a second mortgage on my children or sell my house to a passing gypsy?

Luckily, I had a review copy of *Turbo EMS*. In a matter of a minute or two, I had installed it and was fooling *Illustrator* into thinking I had 32 megabytes of expanded memory. *Turbo EMS* was my hero.

There's no way around it: The difference in cost between fast memory and slower disk storage is larger than it should be. Fast RAM expansions are much too expensive while relatively slow hard drive storage has continually dropped in price. Today's *InfoWorld* reports that the 8MB Boca-Ram memory board has just been *reduced* to $2,195, while a 32MB hard drive can be had for a small fraction of that price. A computer user who lacks the backing of a giant corporation's budget has to ask whether saving a few milliseconds is really worth such a steep price.

Memory Magic

Turbo EMS uses whatever storage beyond 640K is available—including extended memory, expanded memory (it supports the LIM 4.0 and 3.2 standards), hard disk storage, and even (amazingly) floppy disk storage. Lacking extra RAM, I had to rely entirely on my hard disk. A rapid hard disk on a rapid machine will cause delays that are barely noticeable. A bargain-basement hard disk on an XT compatible will cause delays that are more frustrating—though use of this equipment indicates a certain willingness to give up speed to save money.

Although the manual is thorough, readable, and even a little interesting, you probably won't need to read it. I was using *Turbo EMS* for months before I even opened the book. But if you have trouble (as I do) remembering for more than a few minutes the difference between extended and expanded memory, or if you have a specific incompatibility (such as with *Windows* 2.0), the manual can provide the information you need.

Have It Your Way

Turbo EMS's menu-driven installation is logical, friendly, and informative. It lets you make custom configurations

FAST FACTS

Title:	*Turbo EMS*
Category:	Memory-management utility
Features:	Expanded-memory emulation with a hard drive or floppy disk; extended and expanded memory management
Requirements:	IBM, Tandy, or compatible PC; 256K; DOS 2.1 or higher
Publisher:	Merrill & Bryan 9770 Carroll Center Rd. Suite C San Diego, CA 92126
Price:	$99.95

for each of your programs. When you start a program, *Turbo EMS* seeks out the appropriate configuration file to run with the program. Merrill & Bryan, the publisher of *Turbo EMS*, also claims compatibility with networks and relocatable code. You can even modify the program to use custom page-frame alignments and starting memory addresses.

Turbo EMS costs about $100, is easy to install, has an excellent manual, and is compatible with a broad array of programs, including *Lotus 1-2-3*, *AutoCAD*, Borland's *Quattro*, *DESQview*, *Microsoft Windows*, *Excel*, *Ventura Publisher*, and (praise be) *Adobe Illustrator*.

If you need expanded memory and your wallet isn't stuffed with thousand-dollar bills, or if you have compatibility problems with your existing memory and an unsociable program, *Turbo EMS* may be your best solution.

PC SpeedScript

James W. Maki

If you're on a tight budget or interested in how to program a word processor, check out *PC SpeedScript*. It's an inexpensive alternative to commercially produced software. The source code and manual cost only $14.95, and you get all the tools you need to type in the program, as well as instructions and hints for users and programmers. (You'll need *Turbo Pascal* 4.0 or higher, or you can use BASIC if you're willing to type in the machine language listing.)

If typing in a program isn't your idea of a fun weekend, you can also get the program complete with an executable file and the source code in *Turbo Pascal* and assembly language. It comes on one 5¼-inch disk for an additional $12.95 (plus $2.50 postage and handling). For a total investment of about $30.00, you can buy a word processor that will meet most, if not all, of your needs.

PC SpeedScript is a compact program, occupying only 30K of memory. (Laptop users take note: You can place your program and files on a single disk.) To maintain the frugal memory requirements, some frills such as online help, a spelling checker, and mouse support are missing. The program utilizes a text-formatting approach (as does *PC-Write*) in which printer and format commands are embedded in the document. This is different from the approach used in WYSIWYG programs (like *WordPerfect*), where print and format commands modify the screen display in order to mimic the printed output.

Have It Your Way

PC SpeedScript is easy to learn and use. The command summary takes up

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only three pages of the manual. The program has several unique commands that indicate it was written by a user and not by a corporation trying to guess what users need. For example, you use a period as a delimiting symbol when deleting a sentence, and it takes only a single keystroke to move to a new paragraph. In addition, with the source code, you can customize *PC SpeedScript* in whatever way you choose.

As with any good word processor, *PC SpeedScript* supports headers and footers, adjustable margins, search and replace, automatic page numbering, and extensive printer control. The edit file is limited to 64K, but multiple files can be linked together to print out as a single document.

When it comes to controlling your printer, *PC SpeedScript* fails the ease-of-use test. You won't find the usual bunch of printer files that let you configure a program for a variety of printers. Instead, you have to define your own printer commands by referring to the manual. This makes *PC SpeedScript* compatible with any printer, but it prevents novices from immediately using some of their printers' advanced features. As a trade-off, this versatility allows multiple fonts and even graphics to be printed on suitably equipped printers.

The printer problem aside, if you're looking for a bargain word processor that will work on any PC-compatible computer and printer, try *PC SpeedScript*.

FAST FACTS

Title:	*PC SpeedScript*
Category:	Word Processor
Features:	Memory use of only 30K; support for headers and footers; adjustable margins; automatic page numbering; search and replace; extensive printer control; source code for user modification
Requirements:	IBM, Tandy, or compatible PC (including PCjr); 128K; DOS 2.0 or higher; printer
Publisher:	COMPUTE! Books Chilton Book Company 1 Chilton Way Radnor, PA 19089
Price:	$14.95 for printed source code and manual $12.95 (plus $2.50 for postage and handling) for disk with program and source

Hidden Agenda

Barry Brenesal

You've just become the president of a Latin American country, Chimerica. Unfortunately, your predecessor was the dictator, Farsante, who milked the country dry and created the LIMPIA death squads.

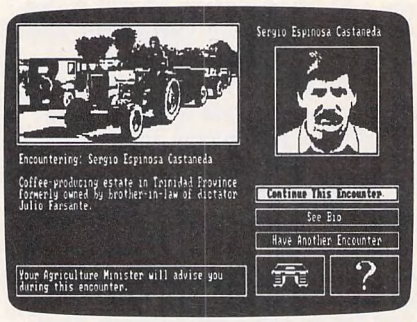
Now it's up to you to turn this bankrupt republic around. Your task is simple: Give everybody what they want—without spending a lot of money. With a little luck and a lot of skill, you might survive your three-year term.

El Presidente

Hidden Agenda, as you might guess, is a simulation about making choices and thinking ahead. If that sounds like chess, imagine chess with six or more sides on the same board, with pieces that not only have minds of their own, but which also hide some of their actions and motives from view. Now you have a reasonable idea of what *Hidden Agenda* is all about.

Another major difference between this game and chess is the level of cultural detail Chimerica brings to the casual tourist. The various spokespeople you encounter look authentic (thanks to some excellent artwork) and sound authentic (whether they're quoting the Bible or some cynical folk wisdom). Their interactions accurately mirror the tensions and alliances of a geographical area noted for its extremes of fantastic wealth and poverty, as well as its stoic alienation and fanaticism.

You begin your term in office by declaring several goals to the media. Then you fill four cabinet posts by choosing from nine candidates. The candidates represent various interests in the three diverse (and mutually antagonistic) national parties. You have valuable information about these people, including brief bios and position statements on a range of issues. Together, you constitute a ruling junta, in which the president is only the first among equals.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See Bio
Have Another Encounter
Your Agriculture Minister will advise you during this encounter.
?

You're el presidente in Hidden Agenda.

Now you're ready to correct Farsante's mistakes. You can consult directly with your ministers, or you can confront any of the more than 30 designated influentials who lead the various factions and hear their complaints. Only where do you start? There's so much to do and so little time. Each decision you make counts for two weeks in the real world, so pick your fights carefully. And remember—any cabinet appointees who don't approve of your directives may choose to drag their feet or do the precise opposite without telling you.

Who Do You Trust?

If you want to know how the three national parties view your actions, you can examine the selected newspaper editorials culled each week by your invisible staff. (Don't be dismayed to see yourself regarded as a Red dupe or a running dog of capitalism, depending upon the source.) Continually updated economic and

FAST FACTS

Title:	*Hidden Agenda*
Category:	Role-playing game
Features:	Realistic scenarios, context-sensitive help, game-save option
Requirements:	IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; CGA or EGA graphics adapter
Publisher:	Springboard Software 7808 Creekridge Cir. Minneapolis, MN 55435
Price:	$59.95

social statistics are also available. They're your only reliable gauge of Chimerica's well-being.

Meanwhile, tread lightly and be prepared for your actions to have unforeseen effects. Bringing Farsante's death squads to justice may result in a right-wing exodus and massive reprisals from across the border—eating up your revenues in defense and endangering your reforms. But if the LIMPIA squads remain free, expect condemnation from the Church and the moderates, while the radical National Liberation Party stages a coup. Alternatively, the death squads could return, and you could end up as a figurehead for General Mercado's military dictatorship.

It's easy to find your way around the game. Using the arrow keys, you move a highlighted bar to switch screens and options. Context-sensitive help is available at any time; you just highlight the question mark. You can also save and reload any number of games. Unfortunately, the quit command doesn't ask for a verification, but exits instantly to DOS.

Springboard is aware of a bug in *Hidden Agenda* which sometimes freezes the program, requiring a reboot. In 27 sessions, this happened to me three times—twice during the third year of play. Until the problem is tracked down (and the company has an excellent reputation for providing free replacements for defective software), a brief save, at least once per season, should minimize your loss if you have a crash.

I found *Hidden Agenda* to be very entertaining. All of its elements (particularly the computer-generated characters) bring a realism to the ever-changing situations. The simulation remains challenging after countless plays because no two gaming sessions are likely to prove identical, given three years of nerve-racking decisions. So faithful is this depiction of Latin American politics that the U.S. Department of State is using *Hidden Agenda* to assist the training of junior diplomats.

Shortcut Utilities

Joyce Sides

DOS shouldn't be hard to use. That's the idea behind the Shortcut Utilities, a set of six programs that make file maintenance easier and faster for beginners and pros alike.

In this review, I'll cover four of Shortcut's six utilities: *Disk/Director,* a file and directory manager; *File/Find,* a program that finds files anywhere on a disk; *Pack/File,* a compression/decompression utility; and *View/File,* a single- and multiple-file viewer.

Manuals Take a Hike

The first thing you'll notice about Shortcut's utilities is their packaging.

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Each program comes in a bright orange, sandwich-sized box. Open the box, and you'll get your next surprise: There's no manual.

In fact, Shortcut calls their programs *no-manual software*. The only command you need to know to get going is SHORTCUT, which you type at the DOS prompt.

You can use the Shortcut Utilities in two ways. You can run each program as a separate, independent module, or you can use the built-in menu system, which allows you to integrate all the utilities and execute them from one common interface.

Each program has a similar look. Like *Xtree* and *PC Tools*, Shortcut fills its main screen with a directory tree. The top lines show the utility's name, the date, the current directory and path, and the user's name (which you provide during installation). Online help is available at the bottom of the screen. The left side of the screen displays the available drives, with a checkmark by the current one.

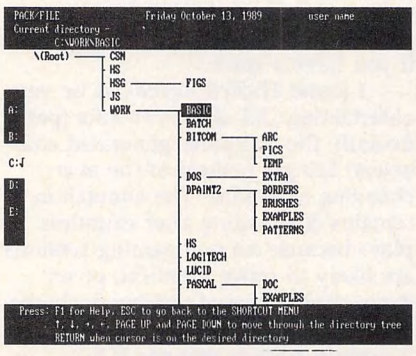
Clean the Clutter

One of the most useful Shortcut Utilities is *Disk/Director*, the file and directory manager. File commands include Duplicate, Copy, Move, Rename, and Delete. All commands (except Rename) can be executed on one file or a group of files.

Directory commands include Create, Delete, and Rename. Rename is especially welcome since you can't rename a directory with DOS.

The Delete file command offers a painless way to free your disk of all the BAK files. First, highlight a directory and press Enter. Choose Delete from the file function menu. Next highlight the *.BAK option and press Enter. It's as easy as that.

You can use an extension with an asterisk (for example *.DOC) to perform a single command on all files with that extension. Or you can tag individual files by highlighting them and pressing the space bar. The command you choose is performed on all your tagged files.



Save valuable disk space with Pack/File.

When a command is executed, you return to the tree structure instead of the main menu. If you want to carry out another command in the same directory, press Enter. The last working directory is highlighted.

Lost and Found

File/Find is another Shortcut gem. To search for a file, you can specify a single directory or the entire drive. All the information you enter appears on the screen. The utility isn't sensitive to case, so it doesn't matter whether you enter the filename in lower- or uppercase. You can press Esc to abort the search.

With 20, 30, or more megabytes on the average hard disk, it's easy to lose one file. One day you copy a file to a directory, and a month later you wonder where you put it. Now it doesn't matter how many times you misplace a file; it will never really be lost with *File/Find*.

Pack It!

If the "battle of the full hard disk" is getting to you, *Pack/File* may have the answer. It compresses program files by as much as 25 percent and text files by as much as 50 percent. Unfortunately, the packing utility is extremely slow. When I used *Pack/File* to compress the files in a directory that contained several large files, it took almost 20 minutes. Compared to other archiving programs—such as PKARC, PKZIP, and LHARC—that's a snail's pace.

Pack/File does, however, have one redeeming quality. Your files can be compressed and uncompressed from a menu. There's no need to enter switches and a list of files at the command line. Just tag the files you want compressed and leave them compressed until you're ready to use them (you can always tell if a file has been packed because it has a BA extension). This menu interface is a must for beginners. It's also convenient for advanced users who aren't in a hurry.

As a safety feature, *Pack/File* won't compress COMMAND.COM, AUTOEXEC.BAT, SYS, or Shortcut files. This scheme protects the files your computer needs to boot and run your system.

Show and Scroll

With *View/File*, you can say good-bye to DOS's TYPE command and take a look at as many files as you like. Simply tag the files you want to read by pressing the space bar when the file is highlighted. *View/File* will display one file after another in alphabetical order. To see the next file, press Enter.

When it comes to looking at a file, *View/File* beats the TYPE command hands-down. With *View/File*, you can scroll back and forth through text, use the cursor keys to scroll by a single line, or press PgUp and PgDn to move through the file one screen at a time.

Once you've finished viewing the last file you selected, you return to the tree structure, so be sure you tag all the files that you want to view in the current directory to avoid repeating the process. When you press Esc to quit the program, you'll find yourself in the directory where you viewed the last file.

Where's the Mouse?

Although I recommend these four packages, there's one feature missing that Orange Software should add: mouse support. Menu-based utilities like these benefit from mouse support more than almost any other type of program. A mouse would make Shortcut's programs even easier to use.

FAST FACTS

Title:	Shortcut Utilities
Category:	File-maintenance software
Features:	Menu-driven interface; fast, easy access to DOS commands
Requirements:	IBM, Tandy, or compatible PC; 384K; DOS 2.1 or higher; any monitor
Publisher:	Orange Software 7525 Ethel Ave. North Hollywood, CA 91605
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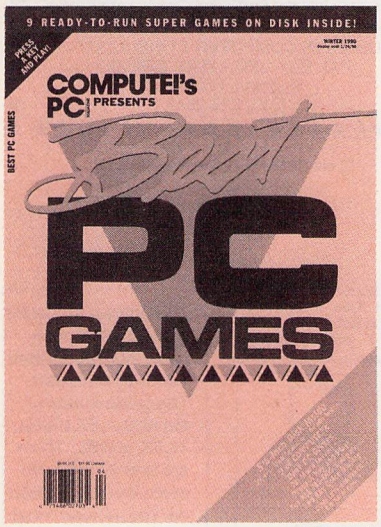

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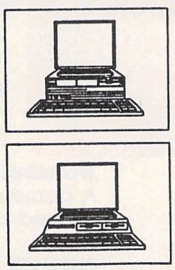

by Chris Brownstead

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The lack of mouse support aside, the Shortcut Utilities are winners. In fact, these programs may save you so much time, you'll be able to go on a picnic—where those bright orange, sandwich-sized boxes may come in handy.

Speedball

Rusel DeMaria

Imagine a game that's a combination of football and soccer, but with a futuristic twist: You play with a steel ball, in a steel-walled arena, against aliens—and everyone wears spiked body armor.

That's the scenario for *Speedball*, a British import from Cinemaware's Spotlight line, and it's a winner.

Speed Control

Speedball features head-to-head competition between 2 five-member teams taken from a stable of 11. In the EGA mode, the graphics are superior, the animation is smooth, and the gameplay is furious.

There's plenty of variety in *Speedball*. You can play against the computer or another player, or you can have the computer play against itself. You can play single games against an opposing team, or you can play a season of games in leagues.

The single-game competition is called Knockout. Here the object is to score at least three points in three games (two points for a win; one for a draw). In the league competition, you play in one- or two-player leagues in seasons that can range from 10 to 100 weeks. In the one-player leagues, you can play a full season, advance to the playoffs, and, if you're good enough, play in the Blood Bowl (the Super Bowl of *Speedball*).

Speedball is a remarkable game. I don't say that lightly. It isn't just the excellent graphics and the challenging action that impress me. It's the intelligence of the game. It sounds strange to talk about intelligence in an essentially brutal sports simulation, but the programmers of this game really knew what they were doing.

Consider this problem: How do you control five players with only one joystick? You can control one and let all the others do what they want, but then you limit the scope of the game. On the other hand, if you allow changing players, the computer-controlled players may not be in the best positions when you need them.

Team Player

In *Speedball*, the computer-controlled players really play the game. They'll block for you when you run down the court, and they'll often place themselves in perfect position for a pass and eventually score. In fact, you get the feeling that you're really part of a team when you play.

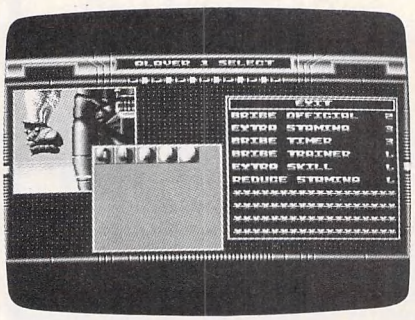
The game does a very intelligent job of switching the active player (the one you currently control). If the ball flies down the court, leaving your current player behind, the active player automatically changes to the one closest to the ball. As long as you're moving a player, you have control. If you want to switch (and the player doesn't have the ball), you just stop moving the player for an instant. A *frame* surrounds the active player, making this team member easy to identify.

The joystick controls are just as intelligent. The joystick moves in the standard eight directions, but the button serves several functions. If you have the ball, pressing the button passes or throws the ball. Press the button longer and you can send the pass high in the air down the length of the court or you can bounce it high off the steel walls. A quick press passes the ball along the court or into the opposing goal.

FAST FACTS

Title:	*Speedball*
Category:	Futuristic sports game
Features:	Choice of three teams; automatic player switching; power tokens
Requirements:	IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; CGA, EGA, or Tandy 16-color graphics adapter; joystick optional
Publisher:	Cinemaware 4165 Thousand Oaks Blvd. Westlake Village, CA 91362
Price:	$39.95

If you don't have the ball, the button will let you slide to quickly make up ground and intercept a loose ball or let you tackle an opponent and steal the ball. A combination slide-and-tackle is a very effective maneuver. If the ball is high in the air, you can press the button to jump for it. When you jump, the overhead view of the field shows your player almost jumping out of the screen.



Bribe the officials in Speedball.

You can choose from among three different teams. The one I like best is Lacerta's team. This team is like the old Oakland Raiders—they'll do what they have to, to get the job done. Each team has its own strengths and weaknesses.

Special Effects

As good as this game is for raw skill and action, it adds still another dimension with the power tokens that appear on the playing field from time to time. Some have an immediate effect—for instance, turning the ball into a weapon that temporarily wipes out your opponents or freezing all the opposition for a few seconds.

You can redeem the other tokens before each game. If you have enough tokens, you can give your team extra stamina or power, or you can reduce the skill of the opposition. I especially enjoyed using the tokens to bribe the officials, referee, timer, and opposition's trainer. When you play weaker teams, you'll spend part of the game collecting a lot of tokens so you can use them later against stronger opposition.

At the end of each league match, you see the league standings. The standings list the important statistics such as goals scored, goals allowed, and games won, lost, and drawn. Your position in the standings is de-

termined by your overall score.

The PC version of *Speedball* doesn't tell you when you're in the Blood Bowl. In other computer versions, more hoopla accompanies the Blood Bowl and the playoffs. The other versions of *Speedball* are also more challenging, in particular, the Amiga and Atari ST versions. Don't think you can master the PC version and then challenge your friends who've played the game on other systems. You may be in for a surprise.

I haven't even mentioned the bounce domes, the warp tunnels, or how tough some of the opposing goalies can be. There's a lot more to tell. But you should try it for yourself. *Speedball* is one of the most addicting, challenging, and intuitively programmed action games I've ever played. You won't quickly tire of this one.

Microsoft QuickBASIC 4.5

David English

BASIC is back.

Now you don't have to mumble when someone asks about your favorite programming language. You can put your BASIC books back on the shelf without fear of embarrassment. The Rodney Dangerfield of computer languages is finally getting some respect.

Basic Evolution

BASIC has come a long way since its humble beginnings at Dartmouth College in 1964. Today, BASIC is the most popular computer language in the world, running on more than 25 million computers. In fact, you probably received an interpreted version of Microsoft BASIC—such as BASIC, BASICA, or GW-BASIC—when you bought your PC.

These interpreted BASICs all have one thing in common: They convert a single line of a program to machine code, execute it, and then move on to the next line. Because of this single-stepping, interpreted BASIC programs are too slow to be used for many applications, including arcade games, complex database programs, and most commercial applications.

Compiled BASICs are different. They translate an entire program directly into machine code, and they do it so quickly that they're almost as convenient to use as interpreted BASICs. And compiled programs run very fast.

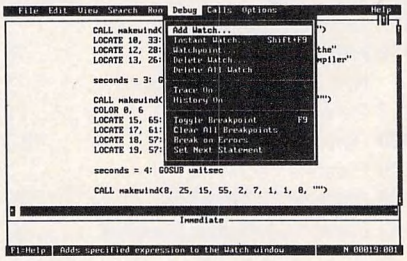
If you're looking for a modern, compiled BASIC, look no farther: Of the best-known new BASICs for the PC, *Microsoft QuickBASIC* has the most features and is the most widely supported by third-party developers.

QuickBASIC is also nearly 100-percent compatible with IBM Advanced BASIC (BASICA) and GW-BASIC, both developed by Microsoft. In many cases, you can directly load, compile, and run your interpreted BASIC programs—just save them as ASCII files. Some statements or functions, especially from the earliest versions of Microsoft BASIC, will not work. The *QuickBASIC* manual includes a list of these and a section on converting BASICA programs to *QuickBASIC*.

One Size Fits All

QuickBASIC provides two different environments: one for the beginner and one for the more advanced programmer. If you're a beginner, you can use the EasyMenus to show only those options that apply to single-module programs. Later, when you have more experience, you can use the FullMenus to see the full range of options.

A comprehensive online help system makes learning the language easy. Help includes descriptions for every *QuickBASIC* keyword, context-sensitive help (place the cursor on any keyword in your program and press the F1 key), and Hyper Links (*QuickBASIC* automatically provides links to related topics when you call up a help screen).



QuickBASIC *sports an integrated debugger.*

The program includes a full-featured editor that automatically capitalizes your program's reserved words and a clipboard to cut and paste blocks of text anywhere within your program. In addition, *QuickBASIC* includes support for graphics, sound, music, and event trapping. Though *QuickBASIC* works best with a mouse, you can also use the keyboard to select commands from the pull-down menus.

QuickBASIC's debugging tools include *watchpoints* that let you halt the program when a variable reaches a certain value and *watch expressions* that display a variable's current value in a special window while the program runs in the main window. Another window, the intermediate window, lets you enter any executable *QuickBASIC* statement and even call your own subroutines.

If you're looking for a powerful BASIC in an easy-to-use environment, you won't go wrong by choosing *Microsoft QuickBASIC* 4.5. If you still feel sensitive about BASIC's former reputation, you can always say your programs were written in C. With *QuickBASIC*'s speed and features, chances are no one will be able to tell the difference.

FAST FACTS

Title:	*Microsoft QuickBASIC* 4.5
Category:	Compiled programming language
Features:	Built-in editor, compiler, and debugger; pull-down menus and dialog boxes; online context-sensitive help; support for libraries of program modules; ability to create executable files
Requirements:	IBM, Tandy, or compatible PC; 384K; DOS 2.0 or higher; minimum of 720K disk-drive capacity; mouse recommended
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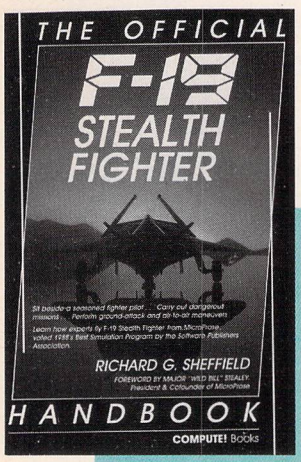

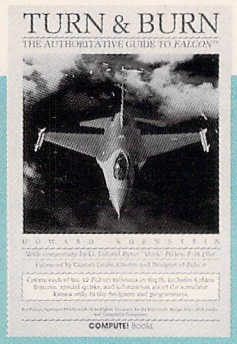

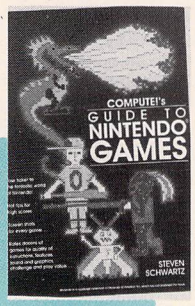

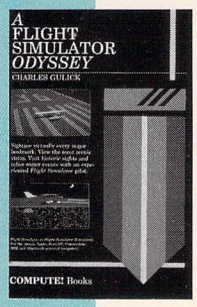

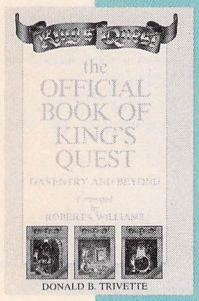

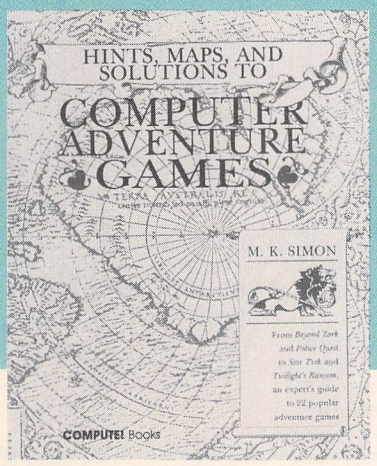

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FAST LOOKS

Autodesk Animator	Professional animation with a PC? Now you can do it with *Autodesk Animator.* The program features traditional cel animation (one frame at a time), optical animation (for swooping and spinning images), polymorphic tweening (to transform one image into another), sophisticated titling (with a variety of custom fonts), and dynamic color cycling (for wild color effects). If you're looking to move images across a PC screen, this is the one to buy. *David English*	IBM AT, PS/2, or 80386 compatible recommended; 640K; VGA graphics adapter; hard drive recommended; mouse or Summagraphics digitizer tablet required	Autodesk 2320 Marinship Way Sausalito, CA 94965 $299
Caveman Ugh-Lympics	If you've ever wondered what your ancestors were doing when they weren't defacing the walls of their cave, this program may have some answers for you. It offers the events Fire Making, Clubbing, and Mate Tossing, among other prehistoric sports that involve dinosaurs and saber-toothed tigers. *Caveman* has excellent graphics and animation. It's a challenging game, but adults may find the cuteness soon wears thin. *Ervin Bobo*	IBM, Tandy, or compatible PC; DOS 2.11 or higher; joystick and hard disk recommended	Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 $29.95
Chef's Accountant	This program coordinates the food items in your pantry with your recipes. It comes loaded with over 300 foods and dozens of recipes. You can modify the inventory and recipes, search for recipes to accommodate the food you have on hand, size recipes for the desired number of servings, and swap recipes via modem. Unfortunately, it takes so much time to maintain the program's database that you won't have any time to cook. *Glenda McClure*	IBM, Tandy, or compatible PC; 512K; two floppy drives or one floppy drive and a hard drive; Hayes-compatible modem optional	Online Search P.O. Box 300247 Arlington, TX 76010 $59.95
Crossword Editor	*Crossword Editor* has everything you need to create your own crossword puzzles. With this remarkable program, you can lay out a crossword puzzle on the computer screen, define your clues, and print out a professional-looking puzzle in the traditional format. It's easy to learn and uses only a few single-keystroke commands. Whether you're a novice or an expert, *Crossword Editor* can save a lot on pencils and erasers. *Jane Cross*	IBM, Tandy, or compatible PC; 256K; DOS 2.0 or higher	Wordplay P.O. Box 19679 Philadelphia, PA 19124 $89.95
DacEasy Word 3.0	*DacEasy Word* is billed as an inexpensive, easy-to-use word processor. It has a variety of features, including a drop-down menu system, a built-in spelling checker, extensive mail-merge capabilities, context-sensitive help, and the ability to edit four files simultaneously. Unfortunately, the screen update is slow, and the interface is not always intuitive. If you can live with its faults, *DacEasy Word* offers a lot for your money. *James W. Maki*	IBM, Tandy, or compatible PC; 384K; DOS 2.0 or higher; printer optional	DacEasy Software 17950 Preston Rd. Dallas, TX 75252 $69.95
DeluxePaint II Enhanced HIGHLY RECOMMENDED	Electronic Arts has enhanced its popular paint program with a new user interface; the ability to read and write TIFF, *MacPaint, ColoRix,* and *Microsoft Windows Paint* 2.0 files; and support for many of the new Super-VGA graphics modes. This version adds a new translucent mode (which lets one image show through another) and six types of gradient fill (for creating dramatic contour and lighting effects). *Bob Guerra*	IBM, Tandy, or compatible PC (286 or 386 recommended); 640K (Super-VGA modes require 512K EMS); DOS 2.1 or higher; graphics adapter; mouse and hard drive required	Electronic Arts 1820 Gateway Dr. San Mateo, CA 94404 $134.95
Disc Director	I wish I could find something that would reorganize my garage as easily as *Disc Director* reorganized my hard drive. It can show a tree display of your files; provide many useful file statistics; search for text across your entire disk; weed out duplicate files; add comments to any file, disk, or directory; and create phantom directories for viewing similar files. You can even launch other applications from within *Disc Director.* *Wayne N. Kawamoto*	IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; hard disk; mouse optional	Athena Software 663 W. Aspen Way Louisville, CO 80027 $79
Disk Technician Advanced HIGHLY RECOMMENDED	This upgrade of a classic hard disk maintenance-and-repair program includes individual track reports and a speedy test utility. Both destructive and nondestructive low-level formatting are available, as are a head-parking routine, interleave setting, and more. This program is thorough: If there's a fixable problem with a sector, *Disk Technician* will find and repair it. For my money, this is the best maintenance buy on the market. *Keith Ferrell*	IBM, Tandy, or compatible PC; 512K; DOS 2.1 or higher; hard disk of no more than 1024 cylinders, 16 heads, 31 sectors per track.	Prime Solutions 1940 Garnet Ave. San Diego, CA 92109 $149

FAST LOOKS

Gauntlet II	The premise is simple. You, as superhero incarnate, must explore yet another labyrinth of more than 100 dungeon-like mazes. You have magic spells and unlimited firepower. They have ghosts, grunts, demons, lobbers, and regular and extra-strength sorcerers, not to mention traps, acid pools, monster generators, and mazes that would drive *Pac-Man* mad. This one-to-four-player game has excellent graphics. It's also fun to play. *Steve Hudson*	IBM, Tandy, or compatible PC; 512K; CGA, EGA, VGA, or Tandy 16-color graphics adapter; joystick or mouse optional	Mindscape 3444 Dundee Rd. Northbrook, IL 60062 $39.95
Grammatik IV	With *Grammatik IV*'s new TSR mode, you can check a document's grammar and style from inside *Microsoft Word, WordPerfect, XyWrite,* and other word processors. New features let you select from six writing styles, create grammar rules, design your own online help, and correct misspelled words. The package includes DeWitt Scott's excellent *Secrets of Successful Writing.* If you work with words, *Grammatik IV* is worth a look. *Clifton Karnes*	IBM, Tandy, or compatible PC; DOS 2.0 or higher; 512K; hard disk	Reference Software 330 Townsend St. Suite 123 San Francisco, CA 94107 $99
Hoyle's Book of Games HIGHLY RECOMMENDED	Avid card players will love *Hoyle's Book of Games*. You can play hearts, crazy eights, cribbage, gin, solitaire, and old maid against a variety of computer-generated opponents. The game's interface is outstanding, especially if you're using a mouse. As is true of most games from Sierra, the graphics and music are excellent. For card buffs, or anyone else for that matter, this program is a must-have. *Richard C. Leinecker*	IBM, Tandy, or compatible PC; 512K; DOS 2.1 or higher; graphics adapter	Sierra P.O. Box 485 Coarsegold, CA 93614 $34.95
My Advanced MailList	This mailing-list management tool is packed with dozens of features to help you organize your data. It prints mailing labels in ten sizes, Rolodex and index cards, and envelopes with return addresses. With the pull-down menus, you can import and export data, categorize, merge, purge, search, and sort up to 30,000 records. It's a miniature database system that's great for club rosters, customer lists, address books, and more. *Tom Netsel*	IBM, Tandy, or compatible PC; 384K; DOS 2.0 or higher	MySoftware 1259 El Camino Real Suite 167 Menlo Park, CA 94025 $49.95
Paradox 2.0	*Paradox* is a relational database that uses the query-by-example method to extract information. The program is easy to use (with a menu command system that's similar to *Lotus 1-2-3*'s) and is available in several versions (single user, six-user LAN pack, 386, and OS/2). It's a good choice when starting out, yet it can also grow with your needs and flex its muscles when you need a more powerful database. *Blake Lambert*	Single-user version: IBM, Tandy, or compatible PC; 512K; DOS 2.0 or higher; two floppy drives or one floppy drive and a hard drive	Borland International 1800 Green Hills Rd. Scotts Valley, CA 95066 $725 for single-user version
Tongue of the Fatman	Step into Mondu the Fat's Fight Palace and challenge alien brawlers to a fight in the intergalactic arena. Forget about a fair fight, take along whatever bizarre weapons you can afford, and place a bet on yourself. Memorizing the 16 moves, jumps, punches, and flips at your disposal is tough but essential. Skip this one if you're a wimp or easily insulted. It's a fun program, but the incessant music made me want to throw in the towel. *Tom Netsel*	IBM, Tandy, or compatible PC; 512K; graphics adapter; sound cards supported	Activision 3885 Bohannon Dr. Menlo Park, CA 94025 $39.95
Turbo Pascal 5.5 HIGHLY RECOMMENDED	With each new version, *Turbo Pascal* gets faster and produces better code. This newest version supports Object Oriented Programming (OOP) and has a built-in debugger that's compatible with Borland's *Turbo Debugger*. Programs compile in seconds—even on a 4.77-MHz 8088-based PC. The only major thing missing is mouse support. Despite this one point, I recommend *Turbo Pascal* to anyone interested in programming. *Jim Fuchs*	IBM, Tandy, or compatible PC; 256K (command-line environment) or 448K (integrated environment); DOS 2.0 or higher	Borland International 1800 Green Hills Rd. Scotts Valley, CA 95066 $149.95
Welltris HIGHLY RECOMMENDED	This game is more than just the official sequel to *Tetris.* With *Welltris,* you slide your blocks down four walls of a well—trying *not* to leave any blocks on the walls. If you do block a wall, you lose the entire wall for three moves. Block all four walls and the game is over. There are other unique features, but the important thing is that *Welltris* is even more addicting than *Tetris.* That should make it *the* game of the year. *David English*	IBM, Tandy, or compatible PC; 256K; one floppy drive	Spectrum HoloByte 2061 Challenger Dr. Alameda, CA 94501 $29.95

LETTERS TO THE EDITOR

PC Volleyball, Bad DOCs, and More

The Editor & Readers

When you started *COMPUTE!'s PC Magazine*, most of your programs were free. Beginning with January 1989, however, shareware has increased in proportion to the free programs. Your November 1989 issue had no free programs. Why the change?

MARGARET B. ANDERSEN
FALWORTH, MA

We decided some months ago to offer only the best software on our disk, whether it was shareware or programs we bought. Since shareware programs tend to be higher quality than most of the programs that are submitted to us, the amount of shareware has increased.

Please note, however, that many of the shareware programs we offer are free, or nearly free. We pay very close attention to the registration requests of the programs we select: We're always looking for bargains.

Arcade Parade

In the Fall 1989 *Amiga Resource*, there's a game called *Arcade Volleyball*. In the article, it says *Amiga version by Rhett Anderson, Tim Midkiff, and Randy Thompson*. Does this mean there's a PC version? If so, could you please publish it?

CHADWICK SEVERN
BRAMPTON, ONT., CANADA

You're in luck. The PC version of Arcade Volleyball *was published in the March 1989* COMPUTE!'s PC Magazine. *If you were impressed with* Arcade Volleyball *on the Amiga, you'll be pleased to know that the PC version is identical. If you're interested in ordering the March magazine and disk, see the ad for back issues elsewhere in the magazine.*

MCGA vs. VGA

I have a comment about the feature "Hot Paint" (November 1989). I have a PS/2 Model 25 with MCGA graphics. It's a shame that this article, and so many others, completely overlooks the merits of MCGA. This format is capable of producing great photographic-quality color. Why hasn't there been more said about MCGA?

DOUG MOORE
RALEIGH, NC

We don't think anyone is trying to overlook MCGA, but that mode—like Tandy 16-color, Plantronics, and PCjr color—is a little outside the graphics mainstream. MCGA is a subset of VGA, found on the IBM PS/2 Models 25 and 30. The reason you don't find MCGA on other machines is simple: Soon after the release of MCGA and VGA, video-card builders realized that it was as inexpensive to build a full VGA card as it was to build an MCGA card. Since full VGA has more modes and higher resolution than MCGA, it became the standard the industry supported.

This doesn't mean that MCGA is a second-class graphics citizen. It's fully compatible with modes through EGA, and it shares several modes with VGA, including a spectacular 320 × 200 × 256 color mode. When you read about VGA programs, look carefully at the modes supported—the software may work with your MCGA graphics.

What's Wrong, DOC?

I've been working with computers since the late 1970s, and I've often been irritated by the sorry state of most computer documentation. From my reading in various computer trade magazines, as well as from conversations with fellow users, I have learned that many people are dissatisfied.

I am working on a magazine article—or perhaps even a book—on the topic. As part of my research, I'm conducting a survey, and I'd like *COMPUTE!'s PC Magazine* readers to help by sending me answers to the following questions.

- On the academic scale of A–F, what overall grade would you give to the computer documentation you've used during the last year?
- What were the most common or severe problems you've had with this documentation?

Thanks in advance.

JOEL KAHN
534 E. GRAND
SPRINGFIELD, MO 65807

Spread the Word

As a new member of the computer world, I'd like to know what *public domain*, *shareware*, and *bulletin board system* mean.

ASHRAF S. YOUNIS
CAIRO, EGYPT

Public domain software has been placed in the public domain, which means that the author claims no rights to the program. You can use and distribute public domain programs as you please.

Shareware is commercial, copyrighted software that's distributed on a try-before-you-buy basis. If you find a program useful or fun, you're on your honor to register your copy with the author and pay the requested fee.

Both public domain and shareware programs are distributed via electronic bulletin board systems, or BBSs. A BBS consists of a host computer and software that can receive and handle telephone calls from other computers. To call a BBS, you need a modem and communications software.

Send questions or comments to Letters to the Editor, COMPUTE!'s PC Magazine, *P.O. Box 5406, Greensboro, North Carolina 27403. We reserve the right to edit letters for clarity and length.* PC

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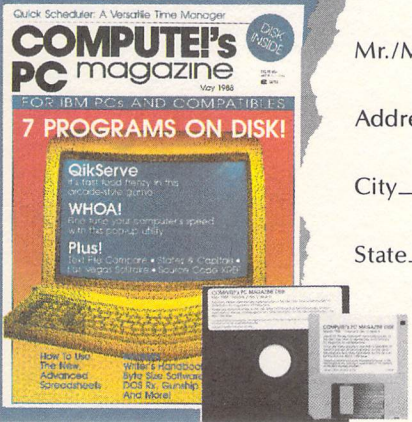

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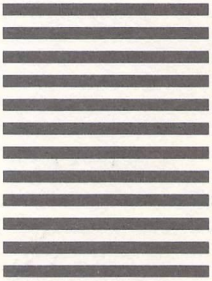

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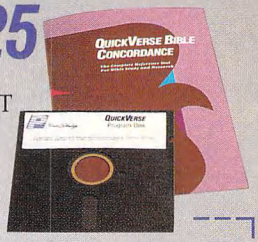

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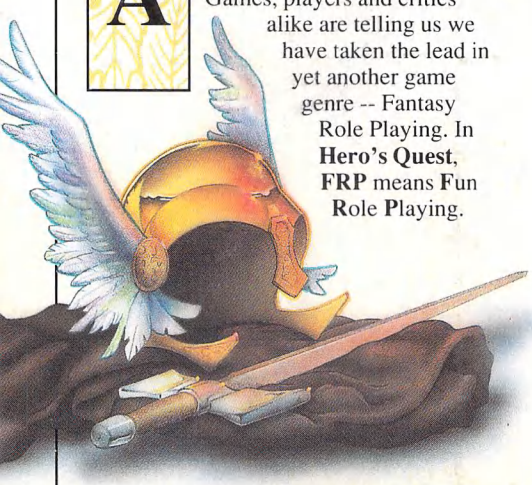

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'...this one has more humor than most CRPG's I've played!'

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'...much of the humor is a great deal more subtle...the sub thing brought me right out of my chair.'

'I like that ending a lot!!! I want to go back and replay...SOON!

'...one of the best of all of Sierra Games...I play the game every chance I get. I highly recommend it to anyone who likes games by Sierra.'

'We can't wait to play HQ II!! Sierra is getting too good at this stuff. It's getting to the darn point where no other computer games are worth buying. Keep it up...just make MORE games.'

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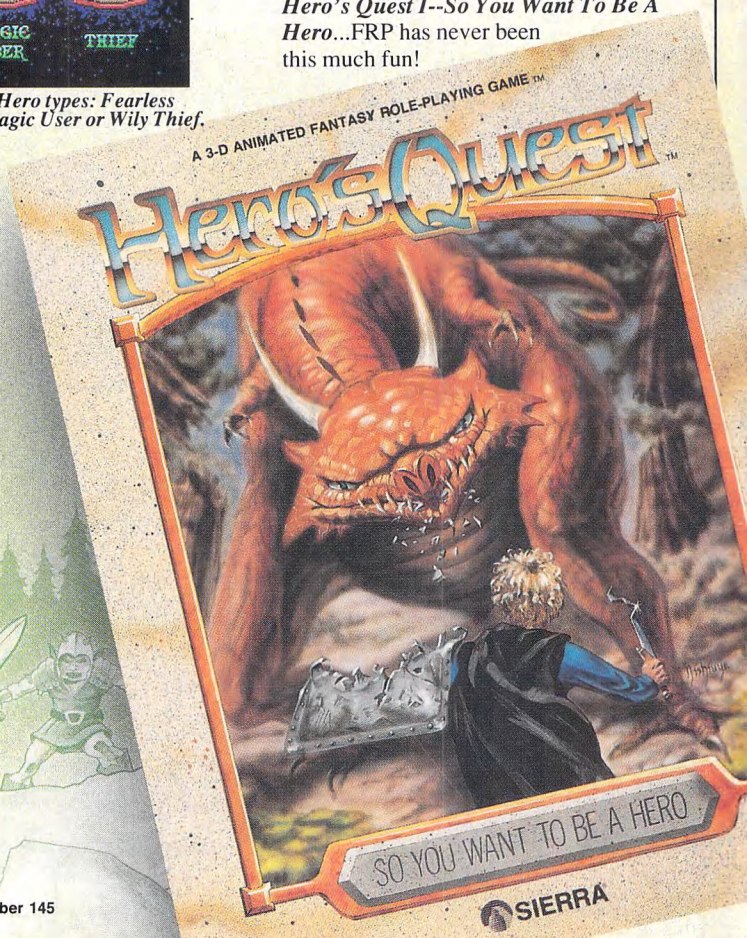

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